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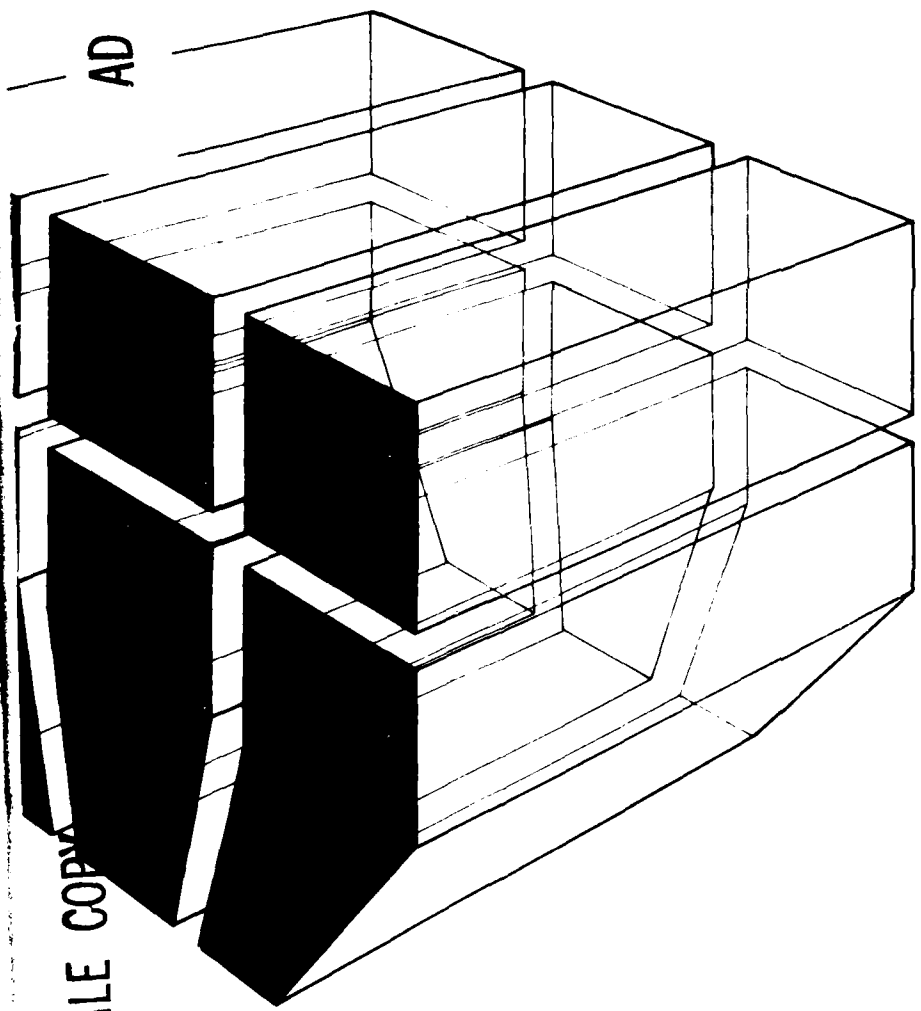
THE TWO-TIER CONCEPT FOR ECONOMIC IMPACT ANALYSIS: INTRODUCTION AND USER INSTRUCTIONS



by
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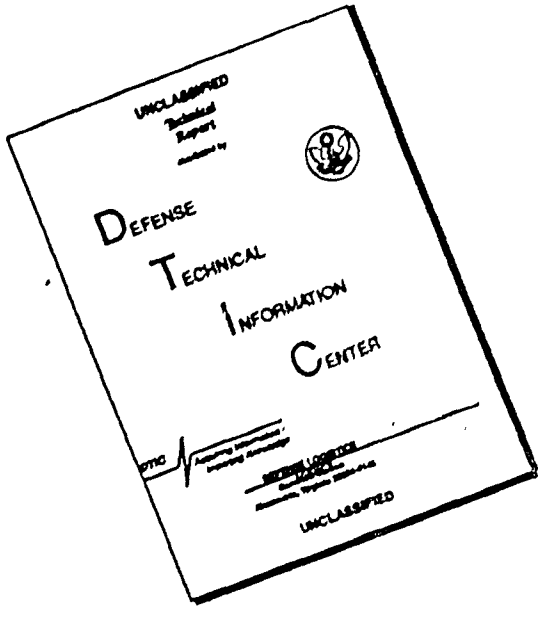

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This report describes the two-tier concept for economic analysis of impacts associated with new Department of Defense programs. The first tier is the Economic Impact Forecast System (EIFS), which is used for conducting a preliminary screening of the impacts. The second tier is the Local Economic Consequences System (LECS), which provides a detailed analysis of realignment impacts. Both systems are available through the Environmental Technical Information System.

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Several other economic impact analysis methodologies were also examined. This study found that a combination of the two-tier concept with the Regional Industrial Multiplier System/Bureau of Reclamation Economic Assessment Model methodologies would provide the best system for analyzing large, sector-specific impacts.

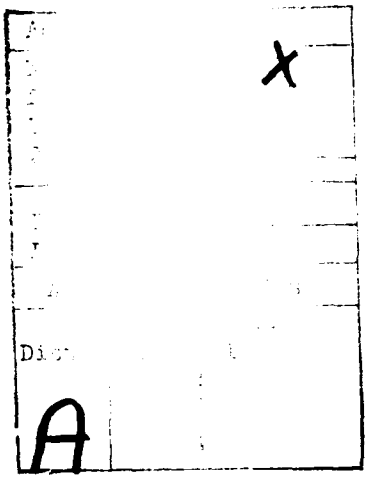
General instructions for using EIFS and LECS are provided. Equations, user input variables, and definitions are also provided.

FOREWORD

This project was performed for the Directorate of Military Programs, Office of the Chief of Engineers (OCE), under Project 4A762720A896, "Environmental Quality for Construction and Operation of Military Facilities"; Task C, "Environmental Assessment"; Work Unit 004, "Development of Economic Impact Forecast System II (EIFS II)." Mr. V. Gottschalk was the OCE Technical Monitor.

This research was made possible through the efforts of DOD personnel, consultants from the University of Illinois, and scientists and engineers of the Environmental Division, U.S. Army Construction Engineering Research Laboratory (CERL).

Administrative support and counsel were provided by Dr. R. K. Jain, Chief of the CERL Environmental Division. COL Louis J. Circeo is Commander and Director of CERL, and Dr. L. R. Shaffer is Technical Director.



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1 INTRODUCTION

Background

Following the passage of the National Environmental Policy Act[1] (NEPA) in 1969, two orders[2] established that all Federal agencies must assess the environmental impacts of their major programs and actions and provide leadership in environmental protection. Because of NEPA's requirement for assessing any impacts on the "quality of human environment," much discussion has surrounded the question of whether this mandate extends to the social and economic impacts of programs and actions. Many courts have decided that in preparing Environmental Impact Statements (EISs), adequate assessment of socioeconomic impacts is as important as assessment of biophysical impacts.

In the past, requirements such as the Case Study Justification Folder (CSJF) documentation for Department of the Army (DA) realignment actions provided for the identification of potential economic impacts and consideration of these impacts in the decision-making process. More recently, Department of Defense (DOD) guidelines have encouraged the consolidation of these considerations into a uniform approach to socioeconomic impact assessment so that all DOD agencies may benefit from a systematic approach and uniform documentation. This quest for uniformity stems, in part, from the uniqueness and geographic distribution of DOD installations, their effects on local economics, and the complexity of problems associated with determining the social and economic impacts of DOD actions.

To address the need for a systematic approach to socioeconomic impact assessment, DA, with cooperation and substantial support from the Department of the Air Force (USAF), has developed the Economic Impact Forecast System (EIFS),[3] which provides information useful for calculating socioeconomic changes caused by DOD actions. This computerized system is designed to be a user-oriented, inexpensive, and systematic approach to meeting the NEPA requirement. EIFS points out significant problems early in the decision-making process so that alternatives may be considered. If no significant impact is shown, documentation of a clear consideration of these impacts is still available.

In response to Executive Order 12049 (1979), which expressed the need for a uniform approach to economic impact studies, DA and the USAF have adopted the use of EIFS as a preliminary screening methodology and have cooperated in the development of the Local Economic Consequences System (LECS) methodology for detailed analysis of specific realignments of USAF personnel. These two efforts resulted in a two-tier approach to analysis of realignment impact. After discussion with DOD committee members charged with establishing a response to Executive Order 12049, this two-tier concept is being adopted as the proposed realignment methodology.

Objective

The objective of this report is to provide an understanding of the two-tier concept, a brief discussion of other methodologies considered, and general instructions for using EIFS (Version 3.0) as the first tier and LECS as the second tier.

Approach

In addition to cooperating with the Air Force Engineering and Services Center (AFESC) in the development of LECS, CERL reviewed other common impact assessment methodologies and evaluated them relative to the needs and constraints of DOD planners. Findings were documented. The LECS methodology and the existing EIFS system were refined to insure theoretical compatibility, better estimates, and ease of use by services other than the USAF. This report was then prepared to explain the two-tier process and the

[1] National Environmental Policy Act of 1970, 83 Stat 852, 42USCS4321, et seq. (January 1970).

[2] Protection and Enhancement of Environmental Quality, Executive Order 11514, 35 F.R. (March 5, 1970); Prevention, Control and Abatement of Environmental Pollution at Federal Facilities, Executive Order 11752, 38 F.R. 34793 (December 19, 1973).

[3] R. Webster, R. Mitchell, R. Welsh, F. Shannon, and M. Anderson, *The Economic Impact Forecast System: Description and User Instructions*, Technical Report N-2/ADA027139 (U.S. Army Construction Engineering Research Laboratory [CERL], 1976); R. Webster, et al., *The Rational Threshold Value (RTV) Technique for the Evaluation of Regional Economic Impacts*, Special Report N-49/ADA055561 (CERL, 1978).

use of both models (both available through the Environmental Technical Information System (ETIS).[4]

Use of This Report

This report is a tutorial and reference document on the practical use of EIFS and LECS under ETIS. It addresses the principles of interactive computing, operation of interactive terminals, and use of appropriate ETIS software. It does not include technical documentation of the algorithms, economic models, or databases. The report is designed to be used initially as a step-by-step guide; when the user has become familiar with the system, it may be kept as a reference.

The report has been divided into sections covering discrete topics. Where possible, an informal approach is used; assumptions of the user's computer expertise are minimized. Usage instructions are presented both in the text and in numerous examples. New users should read the text and examples and then experiment with the system to gain "hands-on" experience.

EIFS and LECS are both evolving systems; new features and improvements are being added continually. Most changes affect only the internal functioning of the system and will not affect the user. Other changes, such as the addition of new profiles, which have relatively minor impact on users, will be announced and documented by system messages. Major changes or accumulated minor ones will be accompanied by a new edition of this manual.

DA Pamphlet 200-2, 7 December 1976, is Version 2.0 of EIFS. The information in this report will be sufficient for understanding a number of future versions of the system. The equations used in Version 3.0 are documented in Appendix A. Further changes will be announced interactively to eliminate duplication of this report.

The Army plans to implement a complete on-line documentation system. Some features are already documented by the program; for example, typing a question mark will command EIFS to print this information. Eventually, at any point where EIFS expects user input, help will be available from the computer. This document itself can be stored in the computer so that the user can call up any section on the terminal screen.

Mode of Technology Transfer

Technology transfer will be accomplished through the revision of DA Pamphlet 200-2, *The Economic Impact Forecast System: Description and User Instructions*. Concurrent with this revision, existing system documentation of the EIFS model will be altered to conform to Version 3.0.

2 THE TWO-TIER CONCEPT

Previous versions of EIFS have been used by members of DOD and other Federal agencies. While the EIFS approach has been successful, particularly for preliminary study, a need exists for more detailed analysis when the impacts are either controversial or significant. Such analysis requires the acquisition of large quantities of data (often at local levels) and resources sufficient to complete the study. Using the two-tier concept, which employs EIFS, Rational Threshold Value (RTV) methodology, and LECS, permits this greater degree of analysis. Figure 1 depicts this methodology. While two factors—controversy or significance—can trigger a more detailed economic analysis, the question of significance can be addressed through the use of the RTV concept. Analyzing historical regional trends and comparing the results of the EIFS outputs can aid in making the determination of significance.

Early in the decision-making process, the proponent of a realignment action is charged with the analysis of various alternatives. This has been described as the "what if" stage of a project. The impacts of the various alternatives must be considered equal in importance to the traditional considerations of mission requirement and economic feasibility. At this stage of the project, it is essential that the proponent of the action be intimately involved in the use of EIFS and the RTV profile to insure that alternatives are considered. Such involvement may lead to the identification of additional alternatives and minimize adverse impacts.

Following this "first-tier" analysis, an examination of the impacts of the alternatives and their relation to the RTVs forms the basis for deciding the significance of the impacts. If the impacts of various alternatives are determined to be insignificant, documentation should be made for potential presentation to interest

[4] R. D. Webster, et al., *Development of the Environmental Technical Information System*, Interim Report E-52, ADA009668 (CERL, 1975); R. D. Webster, R. Mitchell, R. Welsh, E. Shannon, and M. Anderson, *The Economic Impact Forecast System: Description and User Instructions*, Technical Report N-2/ADA027139 (U.S. Army Construction Engineering Research Laboratory [CERL], 1976).

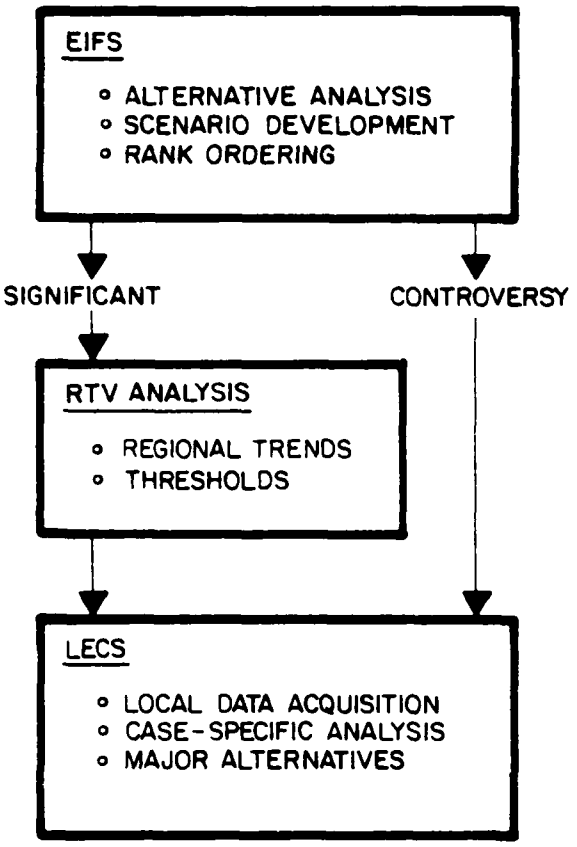

Figure 1. Two-tier concept.

groups or individuals who want additional information. If the review yields significant new information or if considerable controversy results, a more detailed analysis may be necessary. However, a historical review shows that these cases are rare.

If no need for further analysis is implied, the documentation can stand and remains part of the project's records. If the need for a LECS analysis is evidenced, additional resources should be allocated for the data acquisition phase of the LECS methodology. (Data requirements are identified in subsequent sections of this report.) Following this effort, the LECS analysis can proceed. More skilled personnel may be required at this point, because questions are apt to become more technical, and compromises in data and interpretation of output may be needed. (These should be carefully documented.) The cooperation of local interest groups is also essential for the success of the LECS process. EIFS does not require such cooperation, which makes it easier to use for "what-if" analyses; however, in the absence of such support, LECS will prove almost unusable. LECS does not require a higher degree of computer experience, since it has been implemented in the traditional ETIS "user-friendly" environment.

After the LECS analysis, documentation can be completed and become part of the project's records. The entire two-tier concept is then complete. If used appropriately, the two-tier process will minimize expenditures associated with this type of study and insure adequate consideration of local economic impacts.

3 INTRODUCTION TO INTERACTIVE SYSTEMS

Definition

ETIS is an interactive or "conversational" system. To illustrate the distinction between an interactive system and a noninteractive or batch system, consider the following analogy. Ordering something by mail requires filling out an order form, mailing it in, and waiting for delivery. When the product arrives, it may or may not be what was ordered. Exchanging it then requires another time-consuming round of the same process and still may yield an unsatisfactory product. On the other hand when you buy something in a store, a salesperson waits on you, helps you find what you want, and computes the charge. The entire transaction takes a matter of minutes.

A batch system is analogous to the mail-order company, and an interactive system is analogous to a store. Both types of programs accept instructions from the user and deliver results, but there is a great difference in convenience and effectiveness.

With a batch system, the user prepares all input and submits it as a unit; the program responds later with its entire output. Therefore, the user must know what he/she wants before starting. If the input contains an error, it is not discovered until much later, possibly after a long, expensive computer run. In addition, many batch systems require the user to specify several computer factors unrelated to his/her problem, such as how much time the run should take or how many lines of output will be allowed. Running the program may require the user to be versed in the science of computing, calling for the operation of card punches and readers, writing of job control instructions, or interpreting error messages. These tasks may require employing computer consultants who have little or no understanding of the user's requirements.

With an interactive system, the user submits his/her input one step at a time in response to prompting from the computer. Invalid input is discovered quickly and can be modified. Most interactive systems assume that the user has no training in computer operations. System instructions are in the language of the user's field of expertise and require no complex system commands or message interpretation by the user. Interactive systems further assume that the user is unsure of what he/she wants to do; they provide "menus" or lists of options to choose from, with explanations of what each is, and what must be done to get it. The equipment needed to access an interactive system is no more complicated than a typewriter and a telephone; a user often can keep such a device in his/her own office.

ETIS is a large set of programs and databases (a system), residing in a rather small computer called UNIX[5] (also a system), which has its own programs and databases for normal operations. To distinguish between the two "systems," UNIX is often called the "operating" system, while ETIS is an "application" system. Both UNIX and ETIS are interactive; in fact, an interactive application system virtually requires an interactive operating system. Most users will not be aware of UNIX; they will see it only momentarily when they initiate or end a session with ETIS. As users become more familiar with the computer, they may begin to take advantage of some of the many powerful features offered by UNIX itself. The most important of these are the *communication facilities*, which allow users to communicate with each other and with ETIS administrative and maintenance personnel. If problems arise, the user can report them or seek assistance without having to use the telephone or mail. These features are described in the **UNIX Features** section of Chapter 5.

The Terminal

An ETIS user interacts (provides input and receives output) through an interactive terminal. The terminal most commonly used with ETIS is the Texas Instruments "Silent 700" series electronic data terminal, usually referred to as the "TI." The instructions given in this report are for use with the TI model 745; other terminals operate similarly, as indicated by the *manufacturer's instruction book*.

The TI resembles an electric typewriter, but contains extra keys, continuous roll paper, and a receptacle for a telephone handset. Once the user has logged in, the terminal (see Figure 2) is operated like a typewriter, with a few exceptions. The user indicates the end of a line of input by hitting the RETURN key; generally, the computer will not reply until this is done. The RETURN key is often referred to in writing by the symbol <CR>.

In addition to the lower- and upper-case letters and numbers common to typewriters, the terminal has a third set of letters called "control" characters (see Figure 3). These letters are typed by depressing the CTRL key while striking a letter key, in the same way that one types a capital letter on a typewriter. The user need not be concerned with any control characters but

[5] K. Thompson and D. M. Ritchie, *UNIX Programmer's Manual*, 6th ed. (Bell Telephone Laboratories, Inc., May 1975); *Documents for Use with the UNIX Time-Sharing System* (Western Electric Company, 1975); Dennis M. Ritchie, *C Reference Manual* (Bell Telephone Laboratories, 1978).

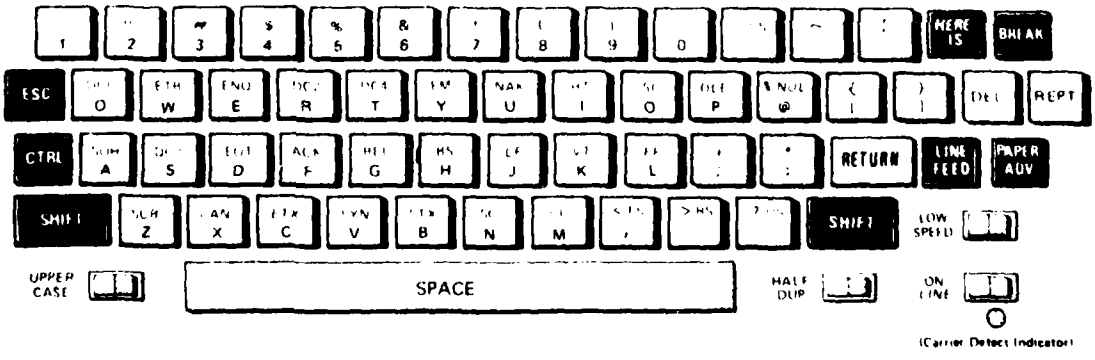

Figure 2. The terminal keyboard. (Materials extracted from *Model 745 Portable Data Terminal Operating Instructions*, Manual No. 984024-9701, Rev. A, with permission of publisher. Copyright 1975, Texas Instruments Incorporated.)

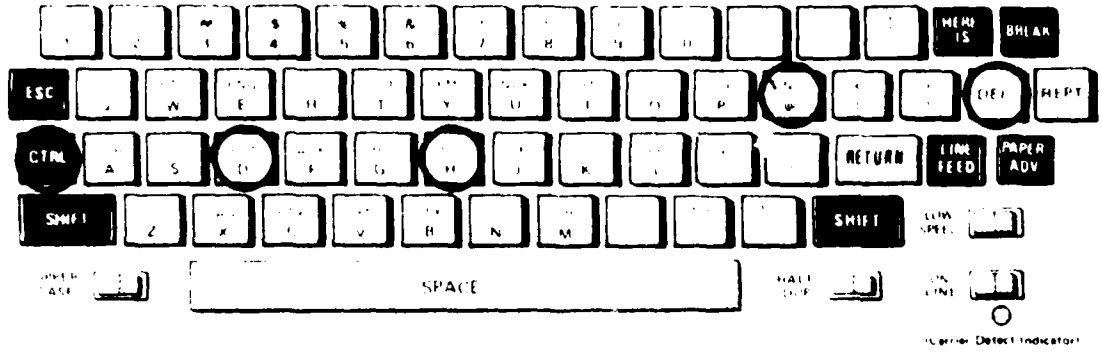

Figure 3. Special keyboard keys. (Material extracted from *Model 745 Portable Data Terminal Operating Instructions*, Manual No. 984024-9701, Rev. A, with permission of publisher. Copyright 1975, Texas Instruments Incorporated.)

the control-d and control-h. Control-d (often referred to in writing by the symbol "D") tells the program that the user is finished, and is also used during logout. Control-h is the backspace key; if a mistake is made when typing a line, the user should backspace over the error and continue with the correct input.

The "at" (@) key performs a related function. It instructs the computer to disregard the entire line just typed and *begin again. It is used when the* control-h backspace is inconveneint (for example, when the whole line is incorrect, or when backspacing and overstriking have obscured the line).

The DEL (some terminals label it RUBOUT) key causes the computer to drop what it is doing and attend to the user; it is usually used to abort a lengthy printout or cancel a requested option after EIFS has started to perform it. It is the only key that does not require the use of another key simultaneously; it is not necessary to follow it with a RETURN.

The following steps should be used to prepare the terminal and connect to EIFS:

1. Set the terminal up in a work area near a telephone.

2. Attach the power cord to the terminal and to an electric outlet.

3. Turn the power switch on.

4. Set the four rocker switches on the keyboard:
   "UPPER CASE" off
   "HALF DUP" off
   "LOW SPEED" off
   "ON LINE" on

5. Dial the UNIX telephone number, (217) 333-1587 or FTS 957-1587.

6. Wait for the computer to answer with a steady tone.

7. Place the telephone handset in the receptacle.

The terminal will signal a successful connection with a green light near the edge of the keyboard. The computer will display an identifying herald and prompt the user to login.

4 INTRODUCTION TO THE ECONOMIC IMPACT FORECAST SYSTEM

CERL developed EIFS to provide DA users with access to selected Department of Commerce statistics regarding the socioeconomic characteristics of any multicounty area in the United States, and a technique for assessing the magnitude and significance of potential socioeconomic impacts on those areas.[6]

[6] R. D. Webster, et al., *Development of the Environmental Technical Information System*, Interim Report I-52/ADA009668 (CERL, 1975); R. D. Webster, R. Mitchell, R. Welsh, L. Shannon, and M. Anderson, *The Economic Impact Forecast System: Description and User Instructions*, Technical Report N-2/ADA027139 (U.S. Army Construction Engineering Research Laboratory [CERL], 1976).

EIFS acts as both an information source and an analytical tool. The current data base is obtained from a variety of sources: Census of Population, Census of Housing, Census of Manufacturers, Bureau of Economic Analysis (BEA) estimates, County Business Patterns (CBP) reports, and private marketing data firms.

Although EIFS was initially available to only a limited number of DA facilities, DA and USAF support prompted expansion to all areas of the United States. Systematic improvement of the EIFS methodology has provided users with additional capabilities and refinements, such as a more realistic export employment multiplier,[7] tract-level socioeconomic data,[8] and the RTV technique.[9] The multiplier, a measure of the total effects of economic activity (first and subsequent spending and respending), is the basis for economic analyses. Previous research has been oriented toward analyzing alternate techniques and consequently the refinement of the EIFS technique by including more detailed data for the internal multiplier calculation.

A method based primarily on the economic export base techniques[10] is used to develop the necessary "multipliers." The export base approach simply assumes that employees which export goods and/or services are the "supporters" of "service" employment or total employment in the region. Further, these export employees can be identified by comparing the percentage distribution of regional employment by sector to that of the nation. Any percentage employment in excess of the national percentage is considered "export employment." The ratio of total employment to export employment then becomes the "export employment multiplier." These multipliers indicate the effect of adding new employees or expenditures to a region. The current version (2.0) of EIFS calculates and uses an employment multiplier; future versions like (3.0) will use both income and employment multipliers.

The present EIFS system has evolved from the two-digit multiplier technique used originally to an improved four-digit multiplier. The original EIFS multipliers were based on the Census Bureau's classification of industries. Since the more aggregated approach would have led to an extreme overstatement of the multiplier, the next step in the EIFS development was to disaggregate the employment data. This was done by using the BEA County Business Patterns (CBP) computer tapes, which break down employment into the four-digit Standard Industrial Category (SIC) code.[11] This four-digit multiplier should more accurately reflect the actual situation, since the additional detail is apt to catch small interindustry transactions. This four-digit multiplier is still an overstatement of the multiplier, although the actual or exact multiplier cannot be scientifically validated. Table 1 shows the effects of disaggregation.

Table 2 indicates the use of the "location quotient" technique for identifying the number of export employees and also indicates the simplicity of the multiplier calculation for a four-sector economic region. The actual technique in EIFS uses between 300 and 800 sectors.

Column 1 of Table 2 gives the percentage of the total national employment that each industry provides, column 2 provides the total employment in the region for each industry, and column 3 calculates the percentage of total regional employment that this industry contains. The location quotient is derived by dividing column 3 by column 1. A location quotient greater than 1.00 indicates that the region exports the commodity to other regions. Location quotients of less than 1.00 imply that the commodity is not produced locally in quantities sufficient to satisfy local needs and, therefore, must be imported. Finally, location quotients equal to 1.00 indicate that the region neither imports nor exports that commodity.

To find export employment in an industry, 1.00 is subtracted from the location quotient, and the answer is divided by the original location quotient (column 5). This answer gives the percentage of the industry involved in export activity. Multiplying column 5 by column 2 provides the number of export employees for each industry. The multiplier is the ratio of export employment to total regional employment. In this example, the multiplier would be 5, indicating that an increase

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[7] Andrew Isserman, "Regional Employment Multiplier: A New Approach: Comment," *Land Economics* (August 1975); R. D. Webster, et al., *Development of the Economic Impact Forecast System (EIFS) - The Multiplier Aspects*, Technical Report N-35/ADA057936 (CERL, 1977).

[8] R. D. Webster and A. B. Moy, *Tract Level Socioeconomic Data Systems*, Interim Report N-45/ADA054935 (CERL, 1978).

[9] R. D. Webster, et al., *The Rational Threshold Value (RTV) Technique for the Evaluation of Regional Economic Impacts*, Special Report N-49/ADA055561 (CERL, 1978).

[10] Charles M. Tiebout, *The Community Economic Base Study*, Supplemental Paper No. 16 (Committee for Economic Development, December 1962).

[11] *Standard Industrial Classification Manual, 1967* (Executive Office of the President, Bureau of the Budget, 1967).

Table 1
The Effects of Disaggregation*

Area	Multiplier: Division Level Data	Two-Digit Level Data	Three-Digit Level Data	Four-Digit Level Data
Georgia	19.01165	6.57299	5.49690	4.84118
Kansas	10.30828	6.51033	4.78054	4.29892
West Virginia	8.32867	4.17737	3.48111	3.14186
Philadelphia Standard Metropolitan Statistical Area (SMSA)	17.24355	9.10950	6.03754	5.18102
Washington, DC SMSA	3.30660	2.97354	2.81134	2.79792
Fort Monmouth Tri-County, NJ	15.68284	7.17098	5.18690	4.47776
Monmouth County, NJ	7.22016	5.16081	3.88481	3.49575

*From Andrew Isserman, "The Location Quotient Approach to Estimating Regional Economic Impacts," *AIP Journal* (January 1977).

Employment data sources: *County Business Patterns, 1972* augmented by data on government employment obtained from the Bureau of Economic Analysis, U.S. Department of Commerce.

of 1 in export demand would cause a change of 5 in regional income. In this case, an increase in demand for one employee would support five regional employees.

Once the total effect of an action or change is ascertained, EIFS distributes the impact to various sectors of the economy. Appendix A is a clarification of the techniques used in Version 3.0.

The size of the multiplier is directly related to the size of the region, the diversity of its industrial and commercial base, and the size of its population. The greater the population size, the more diverse is the region's economic base, and the more likely that purchased products are manufactured locally rather than imported. Therefore, money injected into the economy is "recycled" more often, causing greater changes in income.

Economic base analysis, using location quotients to calculate multipliers, is the basis of EIFS. CERL scientists believe that the advantages of this technique —reliance on published data sources, incorporation of indirect and direct exports, and the relatively minimal costs involved—far outweigh its perceived disadvantages. Some of these perceived disadvantages include a loss in sectoral detail (industry specificity), a tendency toward overestimation (eliminated through data disaggregation), and some theoretical arguments regarding the use of the national employment distribution as a "norm" (and the implied assumption of total self-sufficiency).

Table 2
Location Quotients for a Hypothetical Region

	1	2	3	4	5	6
Industry or Sector	Percent of National Employment	Regional Employment	Percent of Regional Employment	Location Quotient	LQ-1 LQ	No. of Export Employees
Services	.40	400	.40	1.00		
Durable Goods Manufacturing	.20	75	.075	.375		
Nondurable Manufacturing	.10	25	.025	.25		
Trade	.30	500	.50	1.667	.40	200
TOTAL		1,000				

$$\text{Multiplier} = \frac{\text{Total Employment}}{\text{Basic Employment}} = \frac{1{,}000}{200} = 5$$

5 USE OF EIFS

Getting Into EIFS

When a connection has been made, UNIX will reply with a brief identifying message and a prompt for the user's login name. After the user's assigned login name has been typed, the computer will prompt for the matching password. For security, the password will not appear on the terminal printout as it is typed. If the password is typed incorrectly, the computer will print "Login Incorrect" and return to the login prompt. If the user cannot login, he/she should check to see that the login name and password are valid.

After login, the latest UNIX system message will be printed; most or all of these messages will not concern the EIFS user. Occasionally, they will announce when the computer will not be available.

For some users, a special step is required after login; if the last output from the computer was a percent (%) sign, the user should type "etis" (see Figure 4). The percent sign is the UNIX general prompt, indicating that UNIX is ready to take a command from the user. The word "etis" is such a command; it causes UNIX to run the ETIS program, a special umbrella or "shell" program which serves as a user receptionist for several systems, including EIFS. For most users, arrangements are made so that UNIX will automatically run ETIS without an explicit command (see Figure 5).

The next message will welcome the user to ETIS. To go directly to EIFS, type either "4" or "eifs" (see Figure 6). Any news regarding EIFS, such as program changes, will be reported here. EIFS will announce itself.

A typical EIFS usage involves identifying a geographic area for study, requesting one or more profiles and/or impact models, and then either exiting or beginning again by selecting a new study area.

At the end of the EIFS session, typing control-d will return the user to ETIS; typing control-d once or possibly twice more will result in logout, as will hanging up the phone.

In EIFS—Selecting a Study Area

The first step in using EIFS is selecting a study area. A study area consists of one or more counties; a group as large as 800 counties can be accommodated. Counties may be identified by name, by Federal Information Processing Standard (FIPS) code, or by specially defined and named regions (see Figure 7).

To select a county by name, give the name of the county and the name of the state it is in, separated by a comma (for example, "orange, california"). The word "county" is not necessary, but is acceptable. State names can be abbreviated, and EIFS understands several different abbreviations (for example, "ca," "cal," and "calif"). Periods, apostrophes, and spaces that may appear in some names, such as "st. louis," "o'brien," or "de soto," are not necessary, but will be accepted.

To select a county by FIPS code, type the five-digit code number (for example, "06059"). Five digits are necessary, so do not drop an initial zero.

To select one of the predefined regions (mostly military installations), type the name of the region (for example, "fort irwin").

If the study area will include an entire state, use the form "counties of . . ." to select all the counties of a state (for example, "counties of california"). Data will be assembled for each county and added to provide state data. For some purposes, the database already contains state data. To access this, use the form "state of . . ." (for example, "state of california").

If a mistake is made typing a county, state, or region name, EIFS will offer to print a list of counties, states, or regions.

When selecting a study area, the user may type the following editing features: a question mark (?) to get a brief summary of the available specification formats; an asterisk (*) to get a numbered list of the counties selected so far; or a minus sign (−) followed by a number to delete the numbered county from the list (see Figure 8). To delete all the counties, type the DEL key to restart the selection process.

After selecting the study area, type RETURN to proceed to the next step. EIFS will display summary population and land area data for each county in the list selected (see Figure 9), plus totals for the entire group. If the user does not continue, he/she may type control-d to exit from EIFS.

In EIFS—Selecting a Profile

After selecting the study area, the user will be prompted for the profile of interest; typing RETURN

```
U of I Computing Services Office
        Unix System
Login: etis
Password:

Welcome to CERL's

        Environmental Technical Information System

What program?  (Type <cr> to see list):
```

Figure 4. Example of user login with automatic ETIS.

```
U of I Computing Services Office
        Unix System
Login: hamilton
Password:

12Jan79 sys == da.noncpunix. (music)
        For Unix help, type     help

        rp5: 2087. Below 1000 indicates /mnt space shortage; act accordingly.
        Machine room (209 ACB) is locked except 8:30-5:00 Mon-Fri.

Tues:   UNIX reboot 0800 ... back at 0815.
% etis
Welcome to CERL's

        Environmental Technical Information System

What program?  (Type <cr> to see list):
```

Figure 5. Example of user login with UNIX prompt and system messages.

```
What program?  (Type <cr> to see list): eifs

Economic Impact Forecast System (version 2.0)

First county or region (type ? for help):
```

Figure 6. Selecting the EIFS program.

```
First county or region (type ? for help): houston,al
Next county (or <cr> if done): jackson,fl
Next county (or <cr> if done): geneva,al
Next county (or <cr> if done): walton,fl
Next county (or <cr> if done): bay, fl
Next county (or <cr> if done): gulf,fl
Next county (or <cr> if done): henry,al
Next county (or <cr> if done): dale,al
Next county (or <cr> if done): early,ga
Next county (or <cr> if done): miller,ga
Next county (or <cr> if done): baker,ga
Next county (or <cr> if done): grady,ga
Next county (or <cr> if done): thomas,ga
   .    .    .    .    .
   .    .    .    .    .
   .    .    .    .    .
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   .    .    .    .    .
   .    .    .    .    .
Next county (or  cr  if done): gadsden,fl
Next county (or  cr  if done): leon,fl
Next county (or  cr  if done): brooks,ga
Next county (or  cr  if done): cook,ga
Next county (or  cr  if done): madison,fl
Next county (or  cr  if done): taylor,fl
Next county (or  cr  if done): dixie,fl
Next county (or  cr  if done): levy,fl
Next county (or  cr  if done): tift,ga
Next county (or  cr  if done): lee,ga
Next county (or  cr  if done): pike,al
Next county (or  cr  if done): coffee,al
Next county (or  cr  if done): clay,fl
Next county (or  cr  if done): duval,fl
Next county (or  cr  if done):
```

Figure 7. Selecting a study area.

```
First county or region (type ? for help):  ?

you may select individual counties:
by <countyname>,<statename>  eg: los angeles, california
by FIPS code  eg: 06037

you may select certain predefined regions:
by <regionname>  eg: fort benning
by "state of" <statename>  eg: state of illinois
by "counties of" <statename>  eg: counties of illinois
by FIPS codes  eg: 06053,06069,06087

while you are selecting your study area, you may type:
* (asterisk) to show your list of counties so far
-n (n is a number) tc delete the n-th county from your list

if you misspell a county, state, or region name,
you will be offered a list of valid spellings

when you finish selecting your area, type a <return>
to leave Eifs, type a control-d

First county or region (type ? for help):  monterey,ca
Next county (or <cr> if done):  san benito,ca
Next county (or <cr> if done):  santa cruz,ca
Next county (or <cr> if done):  san bernardino,ca
Next county (or <cr> if done):  *

You have selected so far:

  # county
  - ------
  1 monterey, ca
  2 san benito, ca
  3 san bernardino, ca
  4 santa cruz, ca

Next county (or <cr> if done):  -3
deleted
Next county (or <cr> if done):  *

you have selected so far:

  # county
  - ------
  1 monterey, ca
  2 san benito, ca
  3 santa cruz, ca
```

Figure 8. Selecting editing features.

```
You have selected:
     COUNTY                STATE    POPULATION    AREA (SQ MI)
bladen                     nc         26,477          883
cumberland                 nc        212,042          654
harnett                    nc         49,667          603
hoke                       nc         16,436          389
johnston                   nc         61,737          797
lee                        nc         30,467          256
moore                      nc         39,048          704
robeson                    nc         84,842          949
sampson                    nc         44,954          945
scotland                   nc         26,929          319

TOTAL                                592,599        6,499

What profile? (<cr> to see list):
```

Figure 9. Summary population and land area data (by county).

will cause a menu to be printed. Profiles are selected by typing the appropriate profile number.

The overview profile (#1) (Figure 10) provides a wide variety of socioeconomic statistics for the whole study area. The overview-by-county profile (#2) provides these statistics for each county.

The time-series profile (#3) (Figure 11) provides annual income, employment, and population statistics for the study area.

The VALADO profile (#5) (Figure 12) is a variant of the overview, providing a briefer set of general statistics.

The RTV profile (#6) (Figure 13) analyzes historic trends in income, employment, and population to measure the extent of their fluctuation in the past.

The detailed employment profile (#7) (Figure 14) displays employment counts for individual industries. The user will be asked for the level of detail desired, ranging from zero to four in order of increasing industry specificity. For example, level zero refers to total employment, level one refers to broad industry groups, and level four refers to the finest detail available in the database. Levels 2 and 3 are intermediate detail levels. The volume of data printed is directly proportional to the level of detail selected.

The export employment profile (#9) (Figure 15) provides an interregional analysis of the employment data. It also requires the user to specify a level of detail as in profile 7. Furthermore, if the level of detail is preceded by a negative sign, the resulting printout will be limited to export or basic industries.

The census profile (#10) (Figure 16) provides detailed census population, household, and income data at the Census Tract or Minor Civil Division level. Since a county may have hundreds of these units, which will result in a long printout, the number of units is displayed and the system prompts the user to confirm that he/she wants to see them all. This prompt is given for each county for each list; thus, the user may elect to see these data for some counties, but not for others.

The detailed timeseries profile (#11) (Figure 17) is an expanded version of profile 3, providing annual statistics for specific categories of income and employment. Where profile 3 shows trends in a few categories of employment and income, this profile gives a complete timeseries for each category.

All the profiles except numbers 4, 7, 8, 9, and 10 provide state-level as well as county-level data.

Typing a minus sign (-) allows the user to return to the study area selection step to choose a new group of counties.

```
What profile? (<cr> to see list): 1

            CITY COUNTY DATA BOOK
            ==== ====== ==== ====

Land area:                  520 square miles
Total population:       206,038

Pop density:          396.23


Business Volume -- 1967

Manufacturing :    $     57,100,000.00
Retail :           $    325,263,000.00
Service :          $     47,964,000.00
Wholesale :        $    122,273,000.00


            CENSUS OF BUSINESS, 1972
            ====== == ========= ====

Dir gen expend:              143,356,000.00
Educational expend:           66,548,000.00

Total Assessed value:        622,566,000.00
Assesed to sales price ratio:  21.20

Property taxes:               77,524,000.00
Value added -> mfgr:          63,000,000.00
Retail sales:                529,808,000.00
Service reciepts:            112,568,000.00
Wholesale sales:             247,435,000.00


            2ND COUNT CENSUS, 1970
            === ===== =======  ====

Population by age and sex:
  Age        Male       Female       Total
    0       1,595        1,566        3,161
    1       1,520        1,499        3,019
    2       1,518        1,456        2,974
  ...         ...          ...          ...
   20       1,335        1,437        2,772
21-25       7,644        7,913       15,557
26-30       8,374        8,205       16,579
  ...         ...          ...          ...
76-80         947        1,622        2,569
 > 80         862        1,858        2,720

Aggregate $ monthly contract rent --
renter occupied:          4,152,350.00
vacant for rent:            209,265.00

Count of occupied units by tenure --
Owned or being bought:       40,618
Cooperative or condo:           536
Rented for cash rent:        24,612
Rented no cash:               1,840
```

Figure 10. The overview profile.

4RTH COUNT POPULATION, 1970

Population enrolled in school by age (15%) --

age	students
3- 4	2,384
5- 6	6,363
7-13	27,765
14-15	7,513
16-17	7,640
18-19	3,381
20-21	1,615
22-24	1,669
25-34	2,407

Count of employed persons by industry

1	1,609	Agriculture, forestry, and fisheries
2	181	Mining
3	4,590	Construction
4	245	Furniture and lumber and wood products
5	143	Primary metal industries
6	307	Fabricated metal industries
7	500	Machinery, except electrical
8	818	Electrical machinery, equipment, and supplies
9	538	Motor vehicles and other trans. equipment
10	908	Other durable goods
11	697	Food and kindred products
12	356	Textile mill and other textile products
13	1,676	Printing, publishing, and allied industries
14	385	Chemical and allied products
15	1,106	Other nondurable goods
16	316	Railroads and railway express service
17	564	Trucking service and warehousing
18	2,825	Other transportation
19	2,092	Communications
20	1,663	Utilities and sanitary services
21	3,852	Wholesale trade
22	1,680	Food, bakery, and dairy stores
23	2,564	Eating and drinking places
24	1,681	General merchandise retailing
25	1,781	Motor vehicles retailing and service stations
26	5,110	Other retail trade
27	2,386	Banking and credit agencies
28	6,266	Insurance, real estate, and other finance
29	2,651	Business services
30	1,427	Repair services
31	1,128	Private households
32	2,382	Other personal services
33	1,013	Entertainment and recreation services
34	2,910	Hospitals
35	3,018	Med. and other health services except hospitals
36	5,212	Public education
37	1,659	Private education
38	558	Other education and kindred services
39	1,512	Welfare, religious, and nonprofit organizations
40	4,446	Legal, engineering, and misc. professional services
41	5,865	Public administration

Figure 10. (cont'd.)

```
What profile? (<cr> to see list):  3

Income by year:
          non farm          private        government          personal
1962   246,125,000   189,989,000    56,136,000    550,392,000
1965   313,718,000   237,842,000    75,876,000    746,029,000
1966   341,987,000   255,769,000    86,218,000    826,874,000
1967   367,152,000   269,578,000    97,574,000    900,942,000
1968   409,594,000   299,482,000   110,112,000  1,010,636,000
1969   442,347,000   330,182,000   112,165,000  1,107,231,000
1970   477,837,000   355,484,000   122,353,000  1,224,596,000
1971   506,300,000   378,589,000   127,711,000  1,295,184,000
1972   568,645,000   428,347,000   140,298,000  1,406,250,000
1973   636,792,000   487,362,000   149,430,000  1,542,918,000
1974   662,891,000   530,784,000   132,107,000  1,690,763,000
1975   723,132,000   577,565,000   145,567,000  1,869,895,000

Employment and Population:
year   employment   population
1962                   163,095
1965                   186,654
1966                   191,181
1967        56,492     196,227
1968        59,355     201,484
1969        60,467     203,506
1970        60,512     206,779
1971        60,836     206,809
1972        63,910     207,600
1973        67,563     216,185
1974        65,416     211,418
1975        67,498     214,080
```

Figure 11. The timeseries profile.

```
What profile? (<cr> to see list):  5

Export employment multiplier:  2.422
Export income multiplier:  0.000
Constant relating tpi to tbv: 1.2617
Value added per employee: $ 10,916.00

Housing:
Total assessed valuation: $     622,566,000.00
Assessed to market value ratio:       21.20
Property tax rate:                    12.45
Average rent:                       $168.71

Business volume:
Manufacturing:    $      63,300,000.00
Retail:           $     529,808,000.00
Service:          $     112,568,000.00
Wholesale:        $     247,435,000.00
1972 Total:       $     953,111,000.00
1967 Total:       $     552,600,000.00

EDUCATION
=========

Students aged 3 to 19:              55,046
Children aged 0 to 19:              71,954
Percent attending school:            76.50 %
Cost of education per student: $1129.00
Percent federal aid:                 10.00 %
Percent state aid:                   35.20 %


County operating budget for non-education: $      76,808,000.00
State sales tax rate:   4.75 %
Percent of sales tax retained locally: 75.60 %
```

Figure 12. The VALADO profile.

```
What profile? (<cr> to see list):  6

All dollar amounts are in thousands of dollars.
Dollar adjustment based on Consumer Price Index (1967=100).

BUSINESS VOLUME  (using Non-Farm Income)

        Non-Farm     adjusted
YEAR      income       income        change    deviation  %deviation
1965      313,718      331,914
1966      341,987      351,905        19,991       7,770     2.341%
1967      367,152      367,152        15,247       3,026     0.860%
1968      409,594      393,210        26,058      13,837     3.769%
1969      442,347      402,978         9,768      -2,453    -0.624%
1970      477,837      410,940         7,962      -4,260    -1.057%
1971      506,300      417,191         6,251      -5,970    -1.453%
1972      568,645      454,347        37,156      24,935     5.977%
1973      636,792      478,868        24,520      12,299     2.707%
1974      662,891      449,440       -29,428     -41,649    -8.697%
1975      723,132      454,127         4,687      -7,635    -1.676%

average yearly change =      12,221
maximum historic positive deviation =      24,935
maximum historic negative deviation =     -41,649
positive rtv =    5.977
negative rtv =   -6.523

PERSONAL INCOME

        Personal     adjusted
YEAR      income       income        change    deviation  %deviation
1965      746,029      789,299
1966      826,874      850,853        61,555      23,055     2.921%
1967      900,942      900,942        50,089      11,589     1.362%
1968    1,010,636      970,211        69,269      30,769     3.415%
1969    1,107,231    1,008,687        38,477         -23    -0.002%
1970    1,224,596    1,053,153        44,465       5,966     0.591%
1971    1,295,184    1,067,232        14,079      -24,420    -2.319%
1972    1,406,250    1,123,594        56,362      17,863     1.674%
1973    1,542,918    1,160,274        36,681      -1,819    -0.162%
1974    1,690,763    1,146,337       -13,937      -52,437    -4.519%
1975    1,869,895    1,174,294        27,957      -10,543    -0.920%

average yearly change =      38,500
maximum historic positive deviation =      30,769
maximum historic negative deviation =     -52,437
positive rtv =    3.415
negative rtv =   -3.028
```

Figure 13. The RTV profile.

EMPLOYMENT

YEAR	Employment	change	deviation	%deviation
1969	59,355			
1970	60,467	1,112	102	0.172%
1971	60,512	45	-965	-1.596%
1972	60,836	324	-686	-1.134%
1973	63,810	2,974	1,964	3.228%
1974	67,563	3,753	2,743	4.298%
1975	65,416	-2,147	-3,157	-4.673%

average yearly change = 1,010
maximum historic positive deviation = 2,743
maximum historic negative deviation = -3,157
positive rtv = 4.298
negative rtv = -3.131

POPULATION

YEAR	Population	change	deviation	%deviation
1965	186,654			
1966	191,181	4,527	1,784	0.956%
1967	196,227	5,046	2,303	1.205%
1968	201,484	5,257	2,514	1.281%
1969	203,506	2,022	-721	-0.358%
1970	206,779	3,273	530	0.261%
1971	206,809	30	-2,713	-1.312%
1972	207,600	791	-1,952	-0.944%
1973	216,185	8,585	5,842	2.814%
1974	211,418	-4,767	-7,510	-3.474%
1975	214,080	2,662	-81	-0.038%

average yearly change = 2,743
maximum historic positive deviation = 5,842
maximum historic negative deviation = -7,510
positive rtv = 2.814
negative rtv = -1.737

Figure 13. (cont'd).

```
What profile? (<cr> to see list):  7
What level of detail? (type ? for help) :  1

Count of employed persons by detailed industry
SIC CODE   workers     Industry
-----   ----------   ------------------
----          8,248   total
07--             31   agric. srvcs forestry fisheries
10--             42   mining
15--            452   contract construction
1500            100     general building contractors
1600            131     heavy construction contractors
1700            221     special trade contractors
19--          2,295   manufacturing
2300            250     apparel & other textile prod.
2400            269     lumber & wood prod.
3500          1,523     mach. exc. elect.
40--            213   transp. & other public utilities
4200             76     trucking & warehousing
50--            383   wholesale trade
52--          1,902   retail trade
5200            160     building materials & farm equip.
5300            254     general merchandise
5400            206     food stores
5500            460     automotive dealers & service stations
5600             38     apparel & acc. stores
5700             99     furniture & home furnishings stores
5800            502     eating & drinking places
5900            183     misc. retail stores
60--            203   finance insur. & real estate
70--          1,388   services
7000            299     hotels & other lodging places
7200             79     personal srvcs
7500             34     auto repair srvcs & garages
8000            661     medical & other health srvcs
8600            113     nonprofit membership org's
91--            107   total federal
92--          1,220   state & local
99--             12   unclassified establishments
```

Figure 14. The detailed employment profile.

```
What profile? (<cr> to see list):  2

What level of detail (type <?> for help) ? 1
Calculating Location Quotients

Export (Basic) Employment Profile

symbols:
Eir  is local employment in industy i
E*r  is total local employment
Ei*  is national employment in industry i
E**  is total national employment
Xir  is local export employment in industry i
X*r  is total local export employment
all ratios are percentages.
```

SIC	Eir	Xir	LQ	Xir/Eir	Xir/E*r	Xir/X*r	Eir/E*r	Ei*/E**
----	48473	20016	1.703	41.293	41.293	100.000	100.000	100.000
07--	499	424	6.697	85.069	0.876	2.121	1.029	0.279
10--	74	0	1.000				0.153	0.815
15--	2669	685	1.345	25.674	1.414	3.423	5.506	4.635
19--	3050	838	1.379	27.492	1.730	4.189	6.292	25.499
40--	2093	689	1.491	32.910	1.421	3.441	4.318	5.313
50--	1571	375	1.314	23.892	0.774	1.875	3.241	5.557
52--	10415	3470	1.500	33.319	7.159	17.337	21.486	15.886
60--	2919	1043	1.556	35.746	2.153	5.213	6.022	5.352
70--	9598	4271	1.802	44.500	8.811	21.338	19.801	15.142
91--	5283	5283	********	100.000	10.899	26.394	10.899	6.199
92--	9981	2867	1.403	28.729	5.916	14.326	20.591	14.675
99--	383	69	1.218	17.902	0.141	0.343	0.790	0.649

Figure 15. The export employment profile.

```
What profile? (<cr> to see list):  10

champaign, il: 33 MCDs and/or TRACTs

Do you want to see them? yes
```

UNIT	CODE	******** POPULATION *******				----- HH ----		* HH INCOME *		-PER CAP INC-	
		1960	1970	1976	'70GQ	1970	1976	1969	1975	1969	1975
T	1	464	670	867	0	441	597	6,011	12,477	5,276	8,300
T	2	2,225	2,740	2,084	23	859	726	6,238	10,803	1,955	3,643
T	3	3,277	4,010	3,254	648	1,800	1,702	3,710	8,466	4,065	6,181
T	4	5,557	6,818	6,239	5,236	792	796	2,675	9,302	3,656	8,474
T	5	3,633	4,448	4,165	36	1,764	1,725	11,420	19,371	4,529	7,760
T	6	3,369	4,123	3,534	46	1,950	1,744	10,217	14,071	4,832	6,718
T	7	3,885	4,784	4,823	50	1,677	1,767	7,450	8,904	2,611	3,155
T	8	1,430	1,761	2,101	0	488	643	9,392	10,624	2,603	3,144
T	9	4,701	5,788	5,491	6	1,731	1,714	9,000	15,348	2,692	4,635
T	10	4,360	5,368	4,693	49	1,922	1,753	9,607	16,110	3,440	5,622
T	11	4,232	5,211	4,788	0	1,715	1,644	13,300	22,183	4,377	7,371
T	12	7,518	9,256	10,458	112	2,405	2,999	11,527	18,448	3,004	5,128
T	13	4,472	5,506	5,803	7	1,629	1,905	13,957	21,961	4,129	6,975
T	14	3,165	3,897	5,310	3,311	193	273	1,983	6,055	2,935	5,977
T	51	121	166	492	25	103	334	8,079	19,262	6,684	12,342
T	52	1,738	2,377	2,671	61	1,102	1,435	5,762	11,770	4,749	6,467
T	53	2,906	3,974	3,754	273	1,257	1,236	8,146	9,747	2,626	3,172
T	54	3,274	4,478	5,292	77	1,505	1,999	9,234	10,260	3,103	3,749
T	55	4,910	6,715	6,354	235	2,284	2,257	7,836	9,365	2,690	3,250
T	56	3,106	4,248	4,382	6	1,322	1,518	9,654	15,227	3,004	5,103
T	57	3,326	4,549	5,640	0	1,421	1,962	14,251	22,081	4,452	7,429
T	58	3,178	4,346	2,990	263	1,720	1,324	13,199	19,678	5,267	8,506
T	59	4,666	6,382	5,348	4,704	794	600	3,074	5,571	3,394	4,101
T	60	3,559	4,868	3,752	2,291	827	640	3,909	7,084	2,437	2,945
T	101	7,086	6,798	7,098	0	2,082	2,417	7,303	10,507	2,236	3,461
T	102	7,246	6,946	6,878	3	2,209	2,283	7,348	8,791	2,337	2,823
T	103	6,426	6,191	7,193	1,717	969	1,352	6,460	19,327	2,596	5,178
T	104	6,393	10,786	10,175	3,456	2,256	2,326	6,060	10,982	3,235	3,909
T	105	3,307	3,682	3,357	6	1,126	1,142	7,418	13,638	2,269	4,487
T	106	4,716	6,535	8,246	0	2,062	2,900	9,169	10,276	2,893	3,495
T	107	3,617	4,413	4,759	10	1,408	1,694	8,941	10,011	2,853	3,446
T	108	4,596	4,569	3,601	0	1,499	1,320	8,921	16,784	2,927	5,952
T	109	5,977	6,878	7,330	7	2,049	2,424	9,172	10,319	2,733	3,301

TOTALS	'60 POP	'70 POP	'76 POP	'70 GQ	'70 HH	'76 HH
	132,436	163,281	162,922	22,658	47,361	51,151

Figure 16. The census profile.

```
What profile? (<cr> to see list):  11

Employment by Broad Industrial Sources
Full/Part-time Wage/Salary Employment Plus Number of Proprietors

Industry                                1967        1968        1969
Total Employment                      56,492      59,355      60,467
  Number of Proprietors                8,873       9,010       9,086
    Farm Proprietors                     273         260         250
    Nonfarm Proprietors                8,600       8,750       8,836
  Wage and Salary Employment          47,619      50,345      51,381
    Farm                                 414         474         460
    Nonfarm                           47,205      49,871      50,921
      Government                      15,811      16,713      15,814
        Total Federal                  6,901       7,610       6,502
          Federal Civilian             2,847       2,826       2,806
          Federal Military             4,054       4,784       3,696
        State and Local                8,910       9,103       9,312
      Private                         31,394      33,158      35,107
        Manufacturing                  3,595       3,537       3,943
        Mining                            81          72          85
        Contract Construction          2,409       2,440       2,733
        T.C.P.U.                       1,981       2,084       2,147
        Trade                          9,893      10,524      11,196
        F.I.R.E.                       2,034       2,218       2,012
        Services                      10,979      11,834      12,476
        Other Industries                 422         449         515

Industry                                1970        1971        1972
Total Employment                      60,512      60,836      63,810
   ...                                   ...         ...         ...

Industry                                1973        1974        1975
Total Employment                      67,563      65,416      67,498
   ...                                   ...         ...         ...
```

Figure 17. The detailed timeseries profile.

Typing a control-d ends the EIFS section and returns the user to ETIS, where he/she may type another control-d to exit and logout.

In EIFS—Forecast Models

The multiplier examination and modification options (profile #8) (Figure 18) allow the user to see what economic base multipliers have been calculated and to change them if he/she wishes to use his/her own. First, the employment multiplier is displayed and the user is asked what value he/she wants to insert. If no change is needed, typing a RETURN will leave the calculated value unchanged. This procedure is repeated for the income multiplier. In the model printouts, user-supplied multipliers will be flagged to distinguish them from EIFS-calculated multipliers.

The forecast models (profile #4) (shown in Figure 19) allow the user to estimate the impact of an action on the study area. There are several different types of action (Functional Areas) for which there are separate models; the user will be prompted to input the applicable Functional Area (FA). Typing a RETURN will display a menu of FAs. The user then chooses the desired model by typing the appropriate model number. He/she may run the models several times with different inputs; after each model run, EIFS will ask for an FA.

After finishing with the models, the user may type a minus sign (−) to return to the profiles, or a control-d to leave EIFS.

The models are basically similar, but each is adapted to an FA. Each model prompts the user for data describing the action or project and produces a report of calculated impacts. The differences between models are the questions asked of the user. Many of these questions, though phrased differently for different FAs, are actually asking for the same information. For

```
What profile? (<cr> to see list): 8

The employment multiplier is   2.4217.
What multiplier would you like? (<cr> to leave it unchanged):
Multiplier remains unchanged

The income multiplier is   2.4929.
What multiplier would you like? (<cr> to leave it unchanged):
Multiplier remains unchanged
```

a. The examination option

```
What profile? (<cr> to see list): 8

The employment multiplier is   2.4217.
What multiplier would you like? (<cr> to leave it unchanged): 2.633
Assigned multiplier is   2.6330.

The income multiplier is   2.4929.
What multiplier would you like? (<cr> to leave it unchanged): 2.750
Assigned multiplier is   2.7500.
```

b. The modification option.

Figure 18. Multiplier options.

example, each model has a variable that refers to the amount of or change in expenditures associated with an action. In the case of the Construction FA, this quantity is called the dollar volume of the project; in the case of the Operations and Maintenance FA, it is called the annual expenditure for services and supplies. The outputs from the models are very similar and cover changes in employment, income, tax revenue, business volume, and school costs.

Each model asks for a project name, which is any phrase that describes the action being modeled. This name is printed with the output and serves as a label.

```
What profile? (<cr> to see list): 4

Functional Area? (<cr> to see list): 3
TRAINING
Project name: EXAMPLE OF A PROJECT TITLE
```

Figure 19. Forecast model.

This is especially useful when several alternative scenarios will be run for a single action.

All other data the models ask for are numerical quantities. Numeric input consists of a string of numbers which may be preceded by a negative sign, and possibly may include a decimal point. EIFS will ignore any other letters or punctuation. Dollar signs, commas, and percent signs may be used, but are not necessary. Percentages may be input either as whole numbers or as decimal fractions. For example, to specify 50 percent, use either "50" or ".5"; a value less than one (1.0) will be multiplied by 100. Reductions of any kind, either dollars (spending) or employment, are specified as negative numbers.

Running the Models

Construction

The Construction FA model estimates the impact of a construction project. The user supplies values for the following five variables (Figure 20): the dollar volume of the project, the percentage of total volume

```
Functional Area? (<cr> to see list): 1

CONSTRUCTION

Project name: illustration_of_construction_FA
Dollar volume of project: $10,000,000
Percent of local labor: 60%
Percent of local materials: 30%
Average income of military personnel: $15,000
Number families moving onto base from local region: 100

Economic Impact Forecast for illustration of construction FA

Direct volume:                          $     4,877,000.00
Export employment multiplier:                      2.6330
Change in total business volume:        $    12,841,000.00   ( 1.347%)
Induced business volume:                $     7,964,000.00
Change in local personal income:        $    15,227,000.00   ( 1.084%)
Change in expenditures for housing:     $     2,741,000.00
Change in non-housing expenditures:     $     9,593,000.00
Change in local employment:                         1,176   ( 1.842%)
Assessed to market value ratio:                     21.20
Change in local property values:        $    39,564,000.00   ( 1.347%)
Change in housing investment:           $     1,180,000.00
Change in non-housing investment:       $     1,091,000.00
Change in tax revenues:                 $     5,388,000.00
Change in number of school children:                 -115   (-0.208%)
Change in state and fed aid to schools: $       -59,000.00
Change in cost to schools:              $       -71,000.00
Change in other local government costs: $     1,035,000.00
Net change in costs to local gov:       $       964,000.00
```

Figure 20. The Construction Functional Area.

spent locally for labor and services, the percentage of total volume spent locally for materials, the average income of military personnel, and the number of military personnel who will move (with their families) into on-base housing as a result of the construction (in the case of housing construction). Where the construction does not result in families moving on-base, the last two variables are moot and may be given zero values. The sum of the two percentages must not exceed 100 percent.

Operations and Maintenance

The Operations and Maintenance FA estimates the impact of expenditures for base operations. The user provides seven variables (Figure 21): the amount of annual expenditures for services and supplies, the percentage of expenditures paid for labor, the number of civilian employees, the average income of civilian employees, the number of military personnel, the average income of military personnel, and the percentage of military personnel on base.

Training

The Training FA estimates the impact of training activities. The user supplies five variables (Figure 22): the amount of local expenditures for services and supplies, the percentage of the expenditures paid for labor, the number of transient trainees, the average income of the trainees, and the percentage of the trainees living on base.

Mission Change

The Mission Change FA estimates the impact of a major change in a base's operations. The user supplies six variables (Figure 23): the change in expenditures for services and supplies, the change in civilian employment, the average income of civilian employees, the change in number of military personnel, the average income of military personnel, and the percentage of military personnel living on base. The "change" variables should be negative if they indicate a reduction.

UNIX Features

The UNIX operating system offers useful capabilities in addition to EIFS. As users become more experienced with the computer, they may find it advantageous to employ these features. This section describes the communications facilities that UNIX provides.

```
Functional Area? (<cr> to see list): 2

OPERATIONS AND MAINTENANCE

Project name: Illustration of operations and maintenance FA
Annual expenditures for local services and supplies: $4,000,000
Percent of expenditures for labor (0 to 100): 70
Civilian employment: 400
Average income of civilians: $20,000
Military strength: 100
Average income of military personnel: $15,000
Percent military personnel living on base (0 to 100): 0

Economic Impact Forecast for Illustration of operations and maintenance FA

Direct volume:                          $    12,773,000.00
Export employment multiplier:           $         2.6330
Change in business volume:              $    33,630,000.00    ( 3.538%)
Induced business volume:                $    20,857,000.00
Change in local personal income:        $    39,402,000.00    ( 2.805%)
Change in expenditures for housing:     $     7,092,000.00
Change in non-housing expenditures:     $    24,823,000.00
Change in local employment:             $         3,081       ( 4.825%)
Assessed to market value ratio:         $            21.20
Change in local property values:        $   103,617,000.00    ( 3.528%)
Change in housing investment:           $     3,298,000.00
Change in non-housing investment:       $     2,979,000.00
Change in tax revenues:                 $    14,110,000.00
Change in number of school children:    $           115       ( 0.208%)
Change in state and fed aid to schools: $        59,000.00
Change in cost to schools:              $        71,000.00
Change in other local government costs: $     2,710,000.00
Net change in costs to local gov:       $     2,781,000.00
```

Figure 21. The Operations and Maintenance Functional Area.

```
Funcational Area? (<cr> to see list): 3

TRAINING

Project name: Illustration of training FA
Expenditures for local services and supplies: $1,000,000
Percent of expenditures for labor: .5
Number of non-basic trainees: 100
Average income of trainees: 8000
Percent of trainees living on base: 100

Economic Impact Forecast for Illustration of training FA

Direct volume:                          $       888,000.00
Export employment multiplier:           $         2.6330
Change in total business volume:        $     2,339,000.00    ( 0.245%)
Induced business volume:                $     1,450,000.00
Change in local personal income:        $     2,951,000.00    ( 0.210%)
Change in expenditures for housing:     $       531,000.00
Change in non-housing expenditures:     $     1,859,000.00
Change in local employment:             $           214       ( 0.336%)
Assessed to market value ratio:         $            21.20
Change in local property values:        $     7,206,000.00    ( 0.245%)
Change in housing investment:           $       247,000.00
Change in non-housing investment:       $       223,000.00
Change in tax revenues:                 $       981,000.00
Change in number of school children:    $             0       ( 0.000%)
Change in state and fed aid to schools: $          0.00
Change in cost to schools:              $          0.00
Change in otehr local government costs: $       188,000.00
Net change in costs to local gov:       $       188,000.00
```

Figure 22. The Training Functional Area.

```
Functional Area? (<cr> to see list): 4

MISSION CHANGE

Project name: illustration of mission change FA
Change in expenditures for local services and supplies: -55,000,000
Change in civilian employment: -100
Average income of affected civilians: $20,000
Change in military employment: -200
Average income of affected military personnel: $15,000
Percent military personnel living on base (0 to 100): 15

Economic Impact Forecast for illustration of mission change FA

Direct volume:                          $     -8,461,000.00
Export employment multiplier:           $              2.6330
Change in total business volume:        $    -22,286,000.00   (-2.338 %)
Induced business volume:                $    -13,822,000.00
Change in local personal income:        $    -27,211,000.00   (-1.937 %)
Change in expenditures for housing:     $     -4,898,000.00
Change in non-housing expenditures:     $    -17,143,000.00
Change in local employment:             $         -2,042      (-3.197 %)
Assessed to market value ratio:         $              21.20
Change in local property values:        $    -68,665,000.00   (-2.338%)
Change in housing investment:           $     -2,278,000.00
Change in non-housing investment:       $     -2,057,000.00
Change in tax revenues:                 $     -9,351,000.00
Change in number of school children:    $           -210      (-0.563%)
Change in state and fed aid to schools: $       -158,000.00
Change in cost to schools:              $       -192,000.00
Change in other local government costs: $     -1,796,000.00
Net change in costs to local gov:       $     -1,388,000.00
```

Figure 23. The Mission Change Functional Area.

To execute UNIX commands, the user must input them to the UNIX "shell" or executive program. If the login name is one which receives the general prompt (the percent sign) when it is typed, UNIX commands can be invoked directly. If the login is one which automatically invokes EIFS, UNIX commands still can be used from within EIFS. When EIFS prompts the user for input, he/she may issue a command by typing an exclamation mark (!) and then the command. The exclamation mark tells EIFS that the command is for UNIX, and EIFS conveys it for execution. When the command is finished, the user is returned to EIFS, which repeats the prompt, and the user may continue as before.

UNIX provides an electronic mail system (Figure 24) that allows users to communicate discontinuously; that is, the communicating users do not have to be present at the same time. One user may send a message to another who is not logged in. When the second user does login, the system will indicate that he/she has a message. The second user then can read it and reply in the same manner.

Two UNIX commands are involved in this process. The "mail" command sends messages. This command will prompt the user for the main addressee(s) ("To:"), additional addressee(s) ("Cc:"), subject, and text of the message. Addressees are specified by the *login name* of the message recipients. The same message may be sent to several people simultaneously by providing a list of addressees and simply typing all the names, separated by spaces or commas. The "cc" addressee option is useful for keeping a copy of messages sent, and may be invoked by simply including the message sender's login name; to indicate that no extra copies are needed, type a RETURN. The subject input should briefly describe the purpose of the note; although this information is not required, it may be useful to the recipient. When the computer gives the user a

```
Sending Mail:

   mail webster
   Subject: example mail

   hi,

            This is an example of a mail message.

   dennis
   .
   Cc: robinson


Reading Mail:

   mail
   1 message:
       1 robinson Mon Jul 26 09:53  12/141 "example mail"
   1
   From robinson Mon Jul 26 09:53:20 1982
   To: webster
   Subject: example mail
   Cc: robinson

   hi,

            This is an example of a mail message.

   dennis
```

Figure 24. The electronic mail system.

"Type Letter:" prompt, he/she should type the message on a typewriter. Backspaces and "at" (@) signs may be used to make corrections; to cancel the message, exit the mail program by typing DEL. When the message is complete, type control-d to send it. The mail then will be placed in the addressee's "mailbox."

When the user has unread mail in his/her mailbox, UNIX will type the message "You have new mail" immediately after login. If the user does not read it, and later logs in again but has no new mail, the message will change to "You have old mail." To read it, invoke the "mail" command, which will print the mail on the terminal and ask whether it should be saved. Generally, mail should not be saved, so the user should answer "no."

Another form of communication provided by UNIX is interterminal linking (Figure 25). To talk to another user who is also logged in, use the "write" command to initiate a connection between the two communicating terminals; for example, to talk to user Smith, type "write smith." UNIX will then type a message such as: "Message from <user's name> on tty0" on Smith's terminal. To accept a call, invoke the "write" program, using the other user's name. The computer will indicate when the connection has been made, and the other user will initiate the conversation. Henceforth, what the other user types on his/her terminal will also appear on the receiver's terminal, and vice versa. The two users may take turns typing, and the communication will be similar to conversing on a citizen's band radio. Various symbols signal the end of a statement. Some users type "(o)" for "over" when they are ready for the other person to start typing; others type a blank line (by typing RETURN twice). When the

```
write messenger

messenger has been notified

Message from (uicsovax!) messenger on tty31 at 14:56 ...
```

Figure 25. Interterminal linking.

conversation is concluded, exit from the write program by typing a control-d.

Few users are expected to use this interterminal linking capability. Those who do must be careful not to interrupt the work of others; use of the "write" command can make a mess of another user's printout.

6 THE RTV TECHNIQUE

The passage of NEPA generated a renewed interest in the modeling of environmental phenomena. Many experts believed that models would solve the complex problems of environmental analyses. However, these models have frequently fallen short of their proponents' optimistic expectations. Often, this failure can be related to the final interpretation of the model output. One of the requirements of environmental impact analysis is determining the significance of impacts. Model output alone cannot address this requirement; reliable analysis of output is critical.

CERL researchers involved in the development of the Economic Impact Forecast System identified this problem in the economics area. Estimated changes in business volume, income, employment, etc., were provided by the EIFS model, but there was no analysis tool for evaluating model output. This weakness created problems, especially in the economics area, where changes in business volume are often in millions of dollars. A systematic approach for determining a rational threshold value (RTV) for economic and related social impacts has been developed to address this deficiency.

In identifying the significance of a proposed project, the RTV technique also serves as a transition stage between EIFS (the first tier of economic analysis) and LECS (the second tier). This was depicted graphically in Figure 1.

Affected Elements

Consultation with practicing regional economists, environmental analysts, environmental lawyers, and DOD personnel produced the following list of socio-economic impacts to be evaluated by RTV:

1. Change in business volume
2. Change in personal income
3. Change in employment
4. Impact on local government revenues and expenditures
5. Changes in income and employment distribution
6. Impact on local housing
7. Impact on regional economic stability
8. Impact on local school systems
9. Impact on local government bond obligations
10. Change in population

11. Change in welfare and dependence

12. Change in social control

13. Aesthetic considerations.

This list of elements indicates those considerations which have been controversial with respect to DOD projects[12] in the socioeconomic area. Many elements are broadly defined and nebulous, while others are narrowly defined and relatively easy to address. Subsequent sections of this report define these individual elements, clarify their importance, and explain their military relevance.

Change in Business Volume

Business volume is an indication of a region's local aggregate economic activity. As used in EIFS, it is the total dollar flow of the four major sectors of a local economy: the wholesale, retail, manufacturing, and services sectors. As indicated previously, this number, in terms of dollars, can be quite large. The 1972 business volume figures for some representative DA installation regions are as follows:

Installation	Counties in the Region	1972 Values
Fort Bragg, NC	10	$2,783,328,000
Fort Benning, GA	11	1,644,505,000
Fort Bliss, NM	4	1,409,959,000
Fort Campbell, KY	10	590,504,000
Fort Sam Houston, TX	8	3,075,644,000
Fort Monroe, VA	11	2,958,373,000
Fort Riley, KS	8	528,286,000

One could surmise quite accurately that a large change in military activity would be required to significantly affect the figures shown. Changes in total business volume, often large, should be viewed and evaluated using data that can effectively establish some perspective. The identified impact of an action can be quite large, since impacts are traced through the various sectors and the "multiplier" effect is measured. However, this "multiplier" phenomenon is considered in the definition of total business volume; hence, resultant changes, put in perspective, can have remarkably small impacts on business volume in the aggregate.

[12] "Breckinridge et al., vs Schlesinger," U.S. District Court, Eastern District of Kentucky, No. 75-100 (October 31, 1975); "McDowell vs Schlesinger," U.S. District Court, Western District of Missouri, Western Division, No. 75-CV-234-W-4 (June 19, 1975).

Change in Personal Income

Income includes wages and salary for work performed as an employee during a specified time. Changes in income may result from changes in the quantity of work performed or products sold, or from changes in the price of labor. DOD activities affect personal income through the direct addition or removal of income and through the resulting secondary effects on DOD-dependent labor services. This effect can be brought about by changes in the number of salaries or wage earners as well as by changes in activity levels. For example, the reduction in personal income at a facility could be effected through a reduction either in the number of employees or in the number of hours worked per employee.

Change in Employment

DOD actions can affect the number of employees and the work effort per employee.

Employment can be measured in two ways: number of employees and total employment in man-years. These two measures are different, and conversion between the two systems is not simple. The difference in the two concepts is significant, particularly with respect to local controversy. In the latter case, an aggregation occurs, allowing the consideration of both full-time and part-time employees. Considering these various levels of definition, it can be seen that a reduction of 500 man-years of employment will not culminate in 500 unemployed persons. The effects of DOD actions on employment are similar to those on income. The direct impact produces the total effect and can be viewed as a "multiplier" or "ripple" phenomenon.

Impact on Local Government Revenues and Expenditures

Revenues for the operation of local government functions normally will fall into one or more of the following categories: property taxes, sales taxes, income taxes, and State or Federal aid. The importance of each revenue category is dependent on the county or municipal government selected. Real estate or property taxes are the most common methods of providing revenues for local governments. Normally, real property—land, housing, or business—is assessed. Property may be appraised to determine its value, although the appraisal is usually less than the actual market value, the ratio being set by law in many cases. The property tax rate is then applied to the assessed value, and the appropriate taxes collected.

Federal facilities are exempt from local real property

taxation, reducing the total tax base of the community. However, since no revenues are received directly by the facilities, the opening or closing of a facility has no impact on local real property revenues.

Sales tax revenues are dependent on retail sales receipts. Although the sales tax is often viewed as a state tax, the county or municipal governments are rebated a certain portion of the sales tax revenues for local government operation. Often, food items and similar necessities are exempted from sales tax collection. A DOD action will have a significant effect on sales tax revenues through the direct purchase of taxable goods by employees and through generation of economic activity in the taxable retail sales sector.

Income tax revenues are directly related to personal income. Local income taxes are sometimes added to Federal and State income taxes to provide additional local revenues. DOD activities affect the income tax category of revenues by their impact on total regional personal income.

State and Federal aid provide additional revenues for local governments. Although much of this category is actually a rebate of taxes originally collected locally, the impact can often be substantial. Perhaps the most important and substantial form of DOD aid is that given to schools to support the education of dependents of military employees. The removal of these funds often can have a severe detrimental impact on the affected region. For this reason, programs to insure the gradual reduction of support over time are available for implementation.

Local governmental expenditures cover such services as schools and utilities. Schools are usually designed to accommodate a specific number of students. Fluctuations in this number can create severe problems. Utilities such as sewer, water, streets, and lighting are often designed for a certain population level or activity pattern. DOD-related changes can alter the designed load and therefore affect how efficiently these services are used. This lack of efficiency can be a serious problem in cases where a large capital investment has been made and the people needed to pay for the investment through use of its services are gone.

Changes in Income and Employment Distribution

Both income and employment can be measured in aggregate terms, although shortfalls may occur. In the aggregate form, no measure of distribution is available. Most of the employment or income distribution may be contained in only a few sectors of a region, implying a tremendous dependence on these few sectors. An example is the agriculturally based economy. As revenues in this sector fluctuate, service industries based on this sector also fluctuate. If an economy were DOD-service oriented, that economy would fluctuate with installation activity fluctuations. Income distribution measured according to percentage distribution can indicate, to some extent, the region's stability.

Impact on Local Housing

A region's housing market is a good indicator of the area's economic well-being. While increases in housing property value can be attributed to both inflation and increased demand, the demand factor is most susceptible to DOD-related activities. An increase in both an installation's construction activity and the number of personnel living off base can increase the demand for housing. In the former case, the demand is often of short duration, lasting only as long as the workers reside in the area. In the latter case, the demand is long-term only if the additional personnel continue to reside in the community. Reductions in activity almost always negatively affect the demand. These impacts may occur only in certain subregions of the community, or they may occur throughout the community, depending on the distribution of affected DOD personnel.

Impact on Regional Economic Stability

When a local economy is based primarily on a small number of economic sectors, an unhealthy dependence on these sectors is established. The business cycles of these sectors can dictate the condition of the regional economy. Diversity is the key to eliminating these effects. If a DOD action eliminates one principal sector (in many cases, the military sector itself), the elimination reduces the diversity and adversely affects the region's stability.

Impact on Local School Systems

Schools are a form of governmental service. The purely economic ramifications of school impacts can be handled as an impact on the local government's expenditure and revenue balance. However, the social ramifications can require a very different approach. DOD dependents may differ from dependents of civilians to some degree in a local school system with respect to their perceptions, expectations, and social attitudes. These differences may be attributable to their possible increased mobility, different value systems, and different home environments (i.e., living

on base as opposed to the civilian off-base community). These social ramifications required additional study.

Impact on Local Government Bond Obligations

Often, local communities will accept the "status quo" as a permanent situation. As a result, financial obligations in support of schools, utilities, and other municipal projects often are easily obtained. When this "status quo" is interrupted, as in the case of DOD reductions, a heavy financial burden can be placed on the community, creating a tremendous amount of controversy.

Change in Population

Population changes can have both social and economic ramifications. Population change can affect the social strata by removing people who provide leadership or by provoking changes in local institutions or organizations. Population changes often accompany or trigger impacts on local government (for example, impacts on schools) and changes in property values.

Change in Welfare and Dependency

The welfare and dependency agencies assist individuals and families who are temporarily unable to provide for themselves, such as the unemployed. Agencies that provide such services are supported by local and State taxation, grants from other governmental levels, and private charitable organizations. Changes in DOD-related employment and income directly affect the operation of these processes.

Change in Social Control

Social control includes such services as law enforcement, court activities, and related actions. If the number of military and associated personnel increases, there will be a greater demand for social control services.

Aesthetic Considerations

The economic and social well-being of a region is often indicated through somewhat nebulous aesthetic qualities. A region suffering reductions in economic vitality is often characterized by vacant buildings, high unemployment, and other factors which tend to present a bad image of the community to prospective businesses and residents.

These aesthetic qualities represent those agreed upon by personnel familiar with NEPA and recent controversial court actions related to DOD mission changes and realignments. Consideration of these qualities will contribute to proper environmental analysis of the socioeconomic impacts of DOD actions. Although closely related and mutually dependent, all these qualities are individually important when assessing the magnitude of proposed DOD-related changes.

Basis for Development of Indicators To Ascertain the Significance of Impact

To assess the "significance" and derivation of rational threshold values, the list of elements considered must be reduced to insure that the RTV technique is an efficient tool. Assessment can be based on the following considerations.

Predictive Capability of Existing Forecasting Techniques

Regional economics is, at first glance, a very quantitative science. The overall accuracy of state-of-the-art forecasting techniques is still subject to controversy, even among prominent practitioners. Techniques used to evaluate predicted impacts should be chosen so as not to imply an accuracy that is not available. An indicator variable must be selected which is measurable in a practical sense. If no measurement can be assured, standards of evaluation are not useful.

Availability of Data To Adequately Address the Identified Problem

Given that sufficient analysis procedures exist, the availability of adequate data to drive the predictive system also should be assured. The analysis or estimation of regional economic change can be divided into three stages: data acquisition, impact estimation, and impact evaluation. The RTV value itself can be used in the latter stages, and many techniques can be chosen to address the middle stage; the data acquisition stage, however, is often the limiting factor. The best predictive technique cannot be used if its data requirements are unreasonable.

Relative Cost of Effective Implementation

The three phases of economic analysis must be combined into one systemetic tool whose resource requirements are low enough to insure that it can be used in daily operations. The cost of its implementation is directly related to the data requirements, the sophistication of the subsystems, and the number of indicator variables.

Selection and Analysis of Preliminary Indicators

Following the establishment of the above considerations predictive capability, data availability, and relative cost as prime factors in developing the RTV system, elements were consolidated as shown in Figure 26.

Indicators	Elements
Change in Business Volume	Change in Business Volume
Change in Personal Income	Change in Personal Income
Change in Employment	Change in Employment
Change in Population	Change in Population
	Impact on Local Government Revenues and Expenditures
	Impact on Local Housing
	Impact on Local School Systems
	Impact on Local Government Bond Obligations
	Change in Welfare and Dependency
Change in Social Control	
Aesthetic Considerations	
Changes in Income and Employment Distribution	
Impact on Regional Economic Stability	

Figure 26. Consolidation of elements for RTV analysis.

Changes in business volume, employment, personal income, and population are the indicators for these elements; however, population is also an indicator for other significant impacts or elements. The heavy dependence of these variables on population is based principally on the role of a population shift in significantly changing them. Any impacts of the four variables indicated (local government revenues and expenditures, local housing, local school systems, and local bond obligations) would be accompanied and probably driven by a population change. Other problems which might materialize without the population change (for example, if employment were reduced) are still addressed by remaining variables: welfare and dependency, social control, and employment and income distribution.

After the elements or indicators were selected, a means of analyzing them was required. Since some change in a DOD-related activity would be the basis for using the RTV technique, analyzing historical changes seemed to be a reasonable approach. Such an analysis, both in a temporal and spatial sense, would to some extent indicate a region's fluctuating trends. Since temporal data are normally used for this type of analysis, fluctuation of the variables over time was selected as the analysis element.

Figure 27 generally indicates the type of analysis that can be made. The curved line indicates the normal type of growth which can be seen on the majority of plots for any community. As shown, a straight line can be drawn between the final and starting points of the growth curve. This has an averaging effect and tends to indicate very clearly the type of fluctuation exhibited by the community under study. Deviations from the average are plotted. For example, if a growth of 3 percent were shown in a time interval, and the average rate were 5 percent, a negative 2 percent would be plotted. If a growth rate in excess of the average were shown, a positive deviation would be indicated. The concept is based simply on the creation of a "yardstick" against which a specified change may be compared, thus establishing some perspective.

Inflationary trends must be considered in cases where dollar values are used to plot growth. Otherwise, a bias in favor of growth would be developed and the resultant trend would not represent the true fluctuation. To adjust for inflation of the dollar values, the

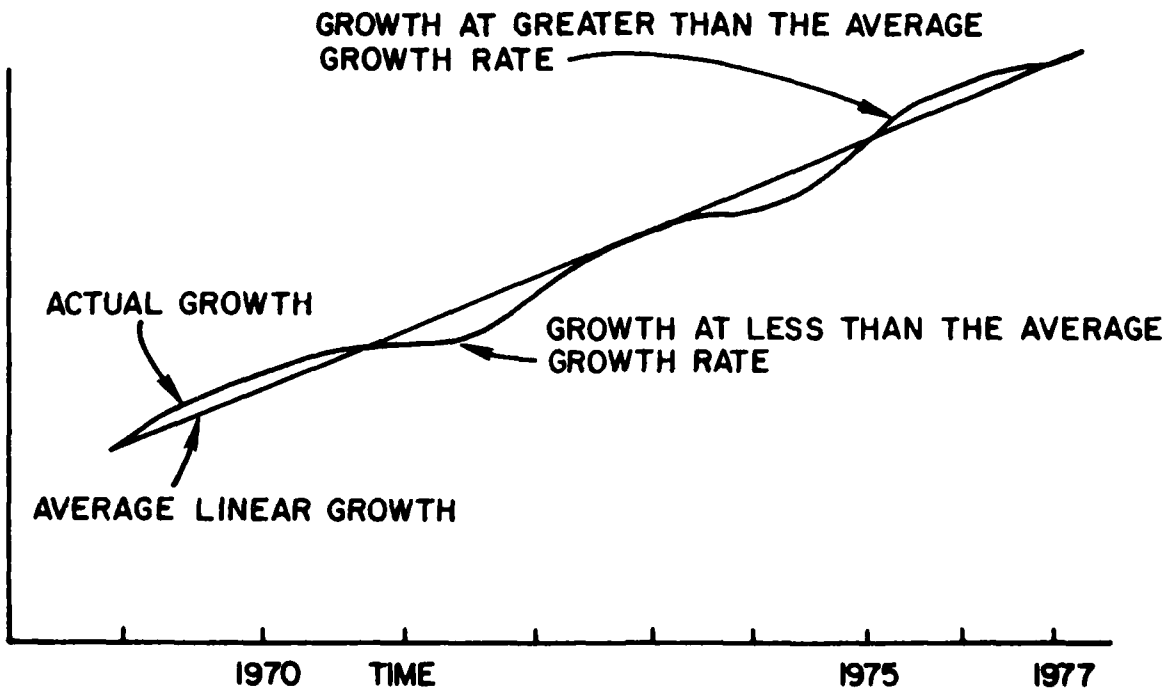

Figure 27. RTV concept.

Consumer Price Index (CPI) was used for the appropriate years, and all dollar values were adjusted to 1967 equivalents. (1967 is normally used as a base year; since the threshold values will eventually become percentages, the results are the same, regardless of the base year used.)

After the indicators and an approach were selected, existing data sources were reviewed. The data source selected was the Bureau of Economic Analysis (BEA) data series which covers income, employment, and population. Figures 28 and 29 indicate the type of data available from this source.

No source with an adequate time series for business volume was available, so some indication of the fluctuation in business volume had to be found. The "nonfarm" category of total personal income (Figure 28) was selected as a measure of business volume fluctuation, based on the fact that a reduction in business volume tends to directly affect total personal income. At its worst, the historical fluctuation exhibited using this method would be less than that found in a "true" business volume measure, resulting in a conservative analysis.

Calculation of the RTV

Using this technique to gauge economic elasticity or resilience, threshold values can be derived which represent the maximum percentages of fluctuation which have occurred historically. These values provide a basis for comparing an action's impact to the historical fluctuation in a particular area. Therefore, the assignment of thresholds is made on an individual basis. No predetermined courses of action can be taken until each region's economy has been evaluated. This systematic approach enables a more defensible conclusion.

In establishing a band of fluctuation around the "average growth rate" variable, and using that band to screen probable impacts, it seems that some degree of conservatism is needed. The band could be made smaller by selecting some arbitrary percentage of the maximum fluctuation—for example, 50 percent. This methodology, although arbitrary, is very similar to the traditional engineering concept that potential threat to human life is often the basis for choosing a factor of safety for bridges, dams, and other projects. A similar weighting system can be devised for the RTV concept, based on a project's potential impact on individuals.

The severity of potential impacts increases in the following order: total business volume, total personal income, total employment, and total population. Business volume impacts can be absorbed by manipulation of factors such as inventory, new equipment, etc. Impacts on individual workers or proprietors are neither assured nor immediate. Changes in employment and income, however, are immediate problems. These impacts usually are accompanied by a corresponding fluctuation in personal income, which also directly affects individuals. Population, as an indicator of potentially controversial impacts in other areas, is extremely important and should be weighted to reflect this importance.

Keeping these relative weightings in mind, the scheme shown in Table 3 was developed. These percentage allowances are arbitrary but sensible. The maximum positive historical fluctuation is allowed without reduction because of the positive connotations of economic growth. Although cases of damaging economic growth have been cited, and although the "zero-growth" concept is being accepted by many local planning groups, the effects of reductions and closures are much more controversial. Figure 27 shows the effect of these weightings on the general concept.

The RTV technique can be used to determine the significance of economic and related social impacts which might result from Army military activities. To insure the efficiency of the RTV, the significance and derivation of RTVs were assessed on the basis of three considerations: predictive capability of existing forecasting techniques; availability of data to adequately address the identified problem; and relative cost of effective implementation. Using the elements selected by these assessment methods, several hypothetical case studies were investigated to ascertain the practicality and usefulness of the technique. Results of these studies indicate that the RTV technique can be used as a screening device to establish the significance of economic and related social impacts resulting from Army military activities.

RTV output can be obtained from the EIFS profiles. It is important to note that the RTV values are regional-specific; that is, they change through the redefinition of the Region of Influence (ROI). The RTV values can be changed only by adding or deleting counties from the defined region. They are completely independent of the modeling techniques used to estimate the magnitude of impact.

CHAMPAIGN ILLINOIS PERSONAL INCOME BY MAJOR SOURCES 1970-75 (THOUSANDS OF DOLLARS)

ITEM	1970	1971	1972	1973	1974	1975
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK 1/						
BY TYPE						
WAGE AND SALARY DISBURSEMENTS 2/	423,595	472,196	503,896	553,468	589,356	616,501
OTHER LABOR INCOME	12,111	13,857	16,206	17,739	20,794	24,151
PROPRIETORS INCOME	45,648	58,531	57,252	86,276	86,045	101,617
FARM	16,006	27,699	24,249	51,991	53,443	66,354
NONFARM	29,642	30,832	33,003	34,285	32,602	35,263
BY INDUSTRY						
FARM	17,213	28,893	25,518	53,518	55,164	68,659
NONFARM	464,141	515,691	551,836	603,965	641,011	673,610
PRIVATE	239,944	262,895	281,147	304,739	337,636	364,731
MANUFACTURING	42,847	43,363	46,993	54,398	63,276	71,750
MINING	608	651	1,012	890	1,056	802
CONTRACT CONSTRUCTION	31,025	39,429	40,021	40,482	40,712	39,600
WHOLESALE AND RETAIL TRADE	69,428	74,962	81,469	91,927	103,174	111,642
FINANCE, INSURANCE, AND REAL ESTATE	10,867	12,475	13,911	14,814	16,029	18,663
TRANSP., COMM. + PUBLIC UTILITIES	21,519	22,699	24,663	26,855	29,818	31,580
SERVICES	62,461	67,869	71,783	74,006	82,177	89,348
OTHER INDUSTRIES	1,169	1,447	1,295	1,367	1,392	1,348
GOVERNMENT	224,197	252,796	270,689	299,226	303,373	308,879
FEDERAL, CIVILIAN	31,700	33,179	34,243	34,667	36,404	40,542
FEDERAL, MILITARY	72,077	86,425	89,225	103,079	94,365	75,517
STATE AND LOCAL	120,420	133,192	147,221	161,480	170,604	192,420
DERIVATION OF PERSONAL INCOME BY PLACE OF RESIDENCE						
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	481,354	544,584	577,354	657,483	696,195	742,269
LESS: PERSONAL CONTRIBUTIONS FOR SOCIAL INSURANCE BY PLACE OF WORK	20,324	21,932	24,189	26,380	30,004	32,379
NET LABOR AND PROPRIETORS INCOME BY PLACE OF WORK	461,030	522,652	553,165	631,103	666,191	709,890
PLUS: RESIDENCE ADJUSTMENT	-21,556	-24,440	-26,359	-28,455	-30,193	-31,452
NET LABOR AND PROPRIETORS INCOME BY PLACE OF RESIDENCE	439,474	498,212	526,806	602,648	635,998	678,438
PLUS: DIVIDENDS, INTEREST, AND RENT	87,220	94,399	100,070	110,444	123,407	132,496
PLUS: TRANSFER PAYMENTS	48,091	54,892	62,734	72,395	83,025	102,887
PERSONAL INCOME BY PLACE OF RESIDENCE	574,785	647,503	689,610	785,487	842,430	913,819
PER CAPITA INCOME	3,516	3,960	4,249	4,778	5,128	5,592
TOTAL POPULATION (THOUSANDS)	163.5	163.5	162.3	164.4	164.3	163.4

1/ EQUALS THE SUM OF WAGES, OTHER LABOR INCOME AND PROPRIETORS INCOME
2/ PRIMARY SOURCE FOR PRIVATE NON-FARM WAGES: ES-202 COVERED WAGES - ILLINOIS BUREAU OF EMPLOYMENT SECURITY

TABLE 5.00 REGIONAL ECONOMICS INFORMATION SYSTEM
BUREAU OF ECONOMIC ANALYSIS

Figure 28. Income statistics available from BEA

EMPLOYMENT BY TYPE AND BROAD INDUSTRIAL SOURCES 1971-75
FULL AND PART-TIME WAGE AND SALARY EMPLOYMENT PLUS NUMBER OF PROPRIETORS

CHAMPAIGN ILLINOIS

	1971	1972	1973	1974	1975
TOTAL EMPLOYMENT	75,017	74,850	78,079	79,553	77,985
NUMBER OF PROPRIETORS	7,105	7,301	7,271	7,268	7,241
FARM PROPRIETORS	2,447	2,448	2,431	2,414	2,379
NON-FARM PROPRIETORS	4,658	4,853	4,840	4,854	4,862
WAGE AND SALARY EMPLOYMENT	67,912	67,549	71,808	72,285	70,744
FARM	375	380	410	428	520
NON-FARM	67,533	67,169	71,398	71,857	70,224
GOVERNMENT	33,192	32,206	34,002	33,524	32,323
TOTAL FEDERAL	14,528	13,249	14,454	12,994	10,796
FEDERAL CIVILIAN	3,519	3,382	3,606	3,808	3,619
MILITARY	11,009	9,867	10,848	9,186	7,177
STATE AND LOCAL	18,664	18,957	19,548	20,530	21,527
PRIVATE NON-FARM 1/	34,341	34,963	37,396	38,333	37,901
MANUFACTURING	4,729	4,904	5,658	6,127	6,264
MINING	63	103	76	95	61
CONSTRUCTION	3,366	3,221	3,592	2,971	2,582
TRANSPORT.,COMM., AND PUBLIC UTILITIES	2,407	2,460	2,399	2,526	2,450
TRADE	12,451	12,910	13,812	14,214	14,121
FINANCE, INSURANCE, AND REAL ESTATE	1,435	1,562	1,684	1,781	1,932
SERVICES	9,744	9,708	10,048	10,451	10,357
OTHER	146	95	125	168	134

1/ PRIMARY SOURCE FOR PRIVATE NON-FARM EMPLOYMENT: ES-202 COVERED EMPLOYMENT- ILLINOIS BUREAU OF EMPLOYMENT SECURITY

TABLE 25.00

REGIONAL ECONOMIC INFORMATION SYSTEM
BUREAU OF ECONOMIC ANALYSIS

Figure 29. Employment statistics available from BEA.

Table 3
Allowable RTV in Percentages of Maximum Historical Deviation in Average Yearly Growth Rate

	Increase*	Decrease*
Change in Total Business Volume	100%	75%
Change in Personal Income	100%	67%
Change in Total Employment	100%	67%
Change in Population	100%	50%

*These percentages represent deviations from average yearly growth rate. The average yearly growth rate is obtained from analysis of data for the past 10 years. In cases where data are not available for the past 10 years, a minimum of 5 years is needed.

7 INTRODUCTION TO THE LOCAL ECONOMIC CONSEQUENCES STUDY

While EIFS, in conjunction with the RTV technique, can measure significance of impact, the need for more detailed analysis can still arise due to: (a) controversy (political or procedural), or (b) the significance of the impact itself. In such cases, a more detailed, case-specific approach is required.

New and changing laws, guidelines, directives, and executive orders have determined that a more detailed methodology to assess controversial proposed actions is needed. In September 1978, the Air Force Engineering and Services Center (AFESC) developed a highly disaggregated socioeconomic model of analysis and used the procedure to analyze Air Force installation realignments and closures announced in April 1978. This model was termed the Local Economic Consequences Study (LECS) methodology and provides more temporal and geographical detail in the output results than does the existing version of EIFS.

LECS is different from EIFS in that user input requirements are considerably more extensive. LECS also requires new software techniques to allow users to make successive runs without having to duplicate extensive input. The input of more extensive data and the increase in marginal commitment of resources by the user significantly improves the quality and sensitivity of the projected impacts.

Substantial quantities of community-specific input data and numerous hand calculations are needed to use the LECS methodology. Much of the required input data is already stored in the EIFS data base, and mathematical calculations are a simple task for the VAX 11/780 minicomputer on which the EIFS operates. Therefore, it is both logical and beneficial to integrate the LECS methodology with the Environmental Technical Information System (ETIS), the overall computerized system for providing information useful in preparing environmental and socioeconomic studies.[13]

LECS development is an ongoing effort which involves coordination among a number of AFESC contractors, AFESC personnel, and CERL staff. The following steps are planned for LECS development.

1. Implement LECS within ETIS.

2. Restructure and extend original LECS equations.

3. Calibrate and document all changes.

4. Restructure the system to meet users' changing needs.

Updates of this manual (documenting revisions and extensions to LECS) will be made annually. In the future, an expanded LECS predictive model with a supporting data base display capability will be created. The LECS system will be capable of being processed as either interactive or batch output.

The LECS model requires inputs from the national, state, and local levels. All LECS data are entered manually into an input file in the current version. Many of the required inputs are now available in the EIFS data base. In this manual, LECS input requirements are divided into three categories: currently available in the EIFS data base, programmed for inclusion in the EIFS data base, and available only from primary sources.

Appendix B presents the data requirements of the current version of LECS and identifies the dates of coverage.

Problems regarding the adequacy of the data base exist in all computer models. Such problems often concern the timeliness of the data and the lack of input for a designated time period (i.e., the "baseline" period). Such problems were addressed in LECS by adding a time-adjustment factor to the model analysis

[13] R. D. Webster, R. L. Welsh, and R. K. Jain, *Development of the Environmental Technical Information System*, Interim Report E-52/ADA009668 (CERL, 1975).

using price deflator ratios. The time-adjustment factor allows users to adjust all dollar impacts to a given baseline year and thus account for inflationary pressures.

8 USE OF LECS

LECS is composed of two computer programs: the Editor and the "new" or "experimental" model. The model is referred to in this way because it still is undergoing development.

The Editor

With the UNIX system, it is possible to use a general-purpose text editor to store inputs in a file for use by a program rather than type "live" input. This procedure requires at least minimal training in UNIX concepts and facilities. A special-purpose editor has been designed and implemented especially for the LECS model, with the following objectives:

1. To allow input to be entered conveniently and recalled later for review and possible modification,

2. To provide users with technical capabilities without requiring advanced programming knowledge of UNIX, and

3. To establish a framework for future development.

The Model: Inputs

The model accepts a "set of inputs" (SOI), performs calculations, and produces output. The Editor facilitates the acquisition, examination, modification, storage, and transmission of SOIs. The remainder of this chapter is a detailed description of the structure and content of an SOI.

The model can prompt the user for an SOI. This is the original CERL implementation, adequate for occasional, nonrepetitive analyses, but inconvenient for large volume use. The model program has been extended to accept specification of a UNIX file as an alternative input source. When a model is invoked from the Editor, the user can either load a particular SOI, or have the Editor invoke a previously loaded SOI to be used as model input. In the latter case, the model will access the file and read the previously loaded SOI.

The Editor possesses a greater capability for SOI-prompting than does the model. Not only can the Editor prompt for an entire SOI in sequence, but it also can display user-selected parts of an SOI and re-prompt for new values of those parts that the user wants to change.

The Editor has a work area in which it keeps the SOI currently being input or edited. Once a complete SOI has been assembled there, the user can invoke the model, using the contents of the work area as input. The Editor also maintains the user's private "file cabinet" of stored SOIs, and allows the user to:

1. Transfer an SOI from a file to the work area.

2. Store the SOI currently in the work area in a file.

3. Invoke the model, using a filed SOI as input.

4. See the names of files, their dates/times of creation, and last use.

5. Destroy files.

The Model: Outputs

The model allows the user to pick which groups of output he/she wants to see (there are about 23 to chose from) and prints only the data requested by the user.

The reader should now have a good overall view of how the LECS Editor/model system operates. Subsequent sections will describe ir more detail how a user interacts with the programs.

Using the System

The LECS methodology is currently available as an EIFS profile. To access the system, a selection from the EIFS profile menu is required. Use of the models is explained in following sections.

Editor Reference (Loser)

Top Level

When you enter the Editor, it will greet you with:

AF LECS (LOSER) Editor (Version 1.0)

and prompt you with:

Which option (type ? for a menu) ?

for commands. This is called the "top level" of the Editor.

To get a menu of the options available at the top level, type a question mark ("?") followed by RETURN. The Editor will respond with:

Type:	To:
1	See a list of your existing files
2	Get a printout of the input questionnaire
3	Enter inputs from your terminal
4	Get the inputs from one of your files
5	Remove one of your files
6	See the inputs you have loaded
7	Run the AF LECS model
8	Examine/change your inputs
9	Store your inputs in a file
−1	Leave the editor

This menu may be accompanied by an additional message, such as:

You have loaded a set of inputs.

or:

You have loaded and edited a set of inputs.

These messages report the status of the Editor's work area. The first message indicates that you have loaded at least part of an SOI, and the second means that you have changed some input in the work area.

When you are finished, type "−1" at the top level; this will return you to ETIS.

Option 1: See a List of Your Existing Files. This option requests the Editor to list the files in your "file cabinet." A listing may look like this:

file name	last change	last use
sample	Jan 2 02:10 1980	Jan 2 02:10 1980
validation	Jan 2 02:10 1980	Jan 2 02:10 1980
goodfellow-1	Jan 2 02:10 1980	Jan 2 02:10 1980
goodfellow-2a	Jan 8 14:17 1980	Jan 8 14:17 1980
goodfellow-2b	Nov 25 09:57 1979	Jan 13 18:40 1980
loring	Jan 2 02:10 1980	Jan 13 20:46 1980

6 file(s) total

The "file name" column shows the labels used to identify each stored set of inputs. File names consist of 1 to 14 letters, digits, and some punctuation marks; it is recommended that punctuation be limited to periods, commas, colons, dashes, sharps ("#"), plus signs ("+"), and parentheses.

The date and time under "last change" indicate when the file was last changed or, if it has never been changed, its date of creation. The date and time under "last use" shows when the file was last accessed by either the Editor or one of the models. It is a good idea to remove files that have not been accessed for a long time (see option 5 below).

Option 2: Get a Printout of the Input Questionnaire. This option requests the Editor to print a copy of the input questionnaire. This is a printout of prompts for inputs, with blanks in which to enter input values. This printout may be used as a "shopping list" while inputs are gathered from various sources, or as a "notepad" to keep all inputs handy at the terminal.

Option 3: Enter Inputs From Your Terminal. This option causes the Editor to prompt for an SOI to be loaded into the work area.

Option 4: Get the Inputs From One of Your Files. This option allows you to retrieve a stored SOI and place it in the work area. The Editor will ask:

Which file?

A null response (typing RETURN) will abort the operation and return you to the top level. Typing the name of a file will cause the Editor to load the SOI stored there into the work area. The previous contents of the work area will be overwritten during this process.

Option 5: Remove One of Your Files. This option allows you to remove a file. The Editor will ask:

Which file?

A null response (typing RETURN) will abort the operation and return you to the top level. Typing the name of a file will cause the Editor to delete the named file, whose contents will be lost as a result.

Option 6: See the Inputs You Have Loaded. If you have loaded a set of inputs, this option will cause the Editor to start printing out the input values by section and group. If you have not loaded a set of inputs, the Editor will print:

you haven't loaded a set of inputs yet!

When the printout terminates, you will be returned to the Editor's top level.

Option 7: Run the AF LECS Model. This option causes the Editor to invoke the "new" model.

If you have loaded a set of inputs into the work area, the Editor will ask:

Do you want to use the inputs you have loaded?

An answer of "y" or "yes" will cause the model to be invoked with input from the SOI currently in the work area. An answer of "n," "no," or RETURN will cause the Editor to proceed to the next question:

Do you want to use one of your input files? An answer of "y" or "yes" will cause the Editor to ask:

Which file?

Typing the name of one file will invoke the model with input from the SOI stored in the named file. A null response (typing RETURN) will cancel the "yes" response to the previous question; that is, it will abort the option of using a stored SOI as model input.

Negative responses to the foregoing options will invoke the model without pre-assembled input; the model will prompt for inputs itself.

When you leave the model, you will be returned to the Editor's top level.

Option 8: Examine/Change Your Inputs. This option allows you to modify the set of inputs currently in the work area. An SOI is divided into "sections," which are divided into "groups." Using this option, you can examine and change the inputs of any group in any section. There are two "levels" in this option: (1) select a section, and (2) select a group within the current section.

The Editor will ask:

Which section (type ? for a menu) ?

To obtain the list of sections, type a question mark:

Type:	For:
1	Section 1 (national/regional productivity and wages)
2	Section 2 (ROI baseline conditions)
3	Section 3 (DOD personnel characteristics)
4	Section 4 (parameters of proposed action)
5	Section 5 (current base conditions)
6	Section 6 (community baseline conditions)
−1	to quit editing

Responding "−1" will return the Editor to its top level. Selecting one of the six sections will move you to the next level, where the Editor will ask:

Which group (type ? for a menu) ?

A response of "−1" for a group will return you to the "select-a-section" level.

The group menus, by section, are as follows:

Section 1: National/regional productivity and wages

Group 1: National employment and output in year t4
Group 2: National employment and output in year t6 (by sector)
Group 3: National employment and income in year tF
Group 4: Distribution of construction sector expenditures
Group 5: State or regional construction sector
Group 6: State or regional wholesale sector
Group 7: State or regional retail sector
Group 8: State or regional service sector

Section 2: ROI baseline conditions

Group 1: ROI income multiplier
Group 2: ROI labor force size
Group 3: ROI population
Group 4: ROI unemployment rate
Group 5: ROI unemployment rate timeseries
Group 6: Regional per capita income in year tH
Group 7: Regional income timeseries

Section 3: AF personnel characteristics

Group 1: Average wages of DOD personnel
Group 2: % of DOD disposable income spent in ROI
Group 3: Working dependents
Group 4: Second jobs
Group 5: % who leave ROI
Group 6: % who do not seek/obtain work
Group 7: Ratio of nonwage income to wage income
Group 8: Taxes and savings
Group 9: % of DOD personnel who currently reside in ROI
Group 10: % of DOD military personnel who live on-base
Group 11: Number of on-base family housing units occupied at t1
Group 12: Rental/ownership status of off-base personnel
Group 13: Mean household size of DOD personnel

Section 4: Parameters of proposed action

Group 1: Dates of realignment period
Group 2: Total terminated or relocated positions
Group 3: Disposition of terminated positions
Group 4: Change in procurement expenditures
Group 5: Current procurement expenditures

Section 5: Current base conditions

Group 1: Personnel currently assigned to installation

Section 6: Community baseline conditions

Group 1: Number of cities in analysis of alternatives (AOA) analysis
Group 2: Name of city or AOA
Group 3: DOD personnel population in AOA
Group 4: AOA population
Group 5: AOA population timeseries
Group 6: AOA housing stock size
Group 7: AOA housing vacancy rate
Group 8: DOD personnel population in balance of ROI

When a group is selected, the existing values are printed, followed by the question:

Do you want to change anything?

A response of "n," "no," or depressing the RETURN key will leave the values unchanged and return the user to the group selection prompt. A positive answer, "y" or "yes," will cause the Editor to prompt for new inputs for the group.

You are free to examine groups in any order, but it is recommended that changes be made, especially in section 6, in the numerical order of the groups. For example, change section 6, group 1, before changing section 6, group 2.

Gainer Model Variations

The Gainer model of LECS uses many of the same types of inputs as the Loser model. The sections of the SOI are the same for the Gainer model, but certain groups within the sections have different names.

The changed group names, by section, for the Gainer model follow:

Section 2: ROI baseline conditions
Group 4: ROI unemployment rate
Section 3: AF personnel characteristics
Group 4: Second jobs, deleted
Group 5: % who leave ROI, deleted
Group 6: % who do not seek/obtain work, deleted
Group 9: % of DOD personnel who currently reside in ROI, deleted
Group 10: % of DOD military personnel who live on-base, deleted.
Group 11: Changed to available on-base housing
Section 4: Parameters of proposed action
Group 2: Changed to total new positions
Group 3: Changed to disposition of new positions
Section 5: Current base conditions
Group 1: Change to total personnel currently assigned to installation
Section 6: Community baseline conditions
Group 3: Change to % new personnel locating in city
Group 8: DOD personnel population in balance of ROI, deleted

Option 9: Store Four Inputs in a File. This option allows storage of the contents of the work area in a file. The Editor will ask:

Which file?

A null response (typing RETURN) will abort the operation and return the user to the top level. Typing the name of an existing file will cause the Editor to respond:

That file already exists; are you sure?

If the contents of the file are to be overwritten with new inputs, you should answer "y" or "yes"; answering "n," "no," or depressing the RETURN key will cause the Editor to ask for another file name. File names consist of 1 to 14 letters, digits, and punctuation marks. It is recommended that punctuation be limited to periods, commas, colons, dashes, sharps ("#"), plus signs ("+"), and parentheses. Once the Editor determines the name of the file in which the inputs are to be stored, it writes the contents of the work area to the file and returns to the top level.

New Model Reference

When you enter the new model, Option 7, you will be greeted by:

Experimental LECS

and prompted by:

Which profile (type ? for a menu) ?

for options. To obtain a menu of the options available, type a question mark ("?") and depress the RETURN key. The model will respond with:

Type:	For:
1	Aggregate productivity
2	Distribution of construction outlays
3	Construction supply productivity
4	State or regional sectors
5	Population projection
6	Change in AF procurement expenditures
7	Distribution of terminated or relocated positions
8	AF personnel spending
9	Distribution of secondary employment impact
10	Distribution of second jobs
11	Distribution of working dependents
12	Distribution of unemployment impact
13	Distribution of labor force impact
14	Labor force projection
15	Estimated labor force conditions at t2 *with/without action*
16	Estimated personal income at t2 without action
17	ROI population
18	ROI population impact
19	Distribution of military personnel currently at installation
20	ROI housing impact
21	City population impact
22	City housing impact
23	City housing vacancy impact
ALL	All of the above
−1	To leave LECS

When you are finished, type "−1"; this will return you to the Editor. For the Gainer model, Profile 10 is deleted from the above table.

Set of Inputs (SOI)

This section deals with the input data (SOI) for the LECS program. These input requirements are presented according to section and group as they appear in the computer's input request.

The SOIs are essentially the same for both the Loser and Gainer models of LECS. The SOIs shown in this section are for the Loser LECS program. Where inputs are different for the Gainer LECS program, a special notation will identify the differences.

The "synopsis" identifies the variable name requested by the computer or shown on the input form, if requested.

The "description" explains the variables' utility in the overall LECS methodology and further defines the variables.

The "sources" identify common sources for the data elements.

The "example" illustrates the type or form of user input.

Section 1, Group 1 - National Total Output and Employment

Synopsis:

National output (GNP) in year t4: .....
National unemployment in year t4: .....
Date of year t4: .....

Description:

The model uses this group of inputs, along with groups 2 and 4 in this section, to calculate a weighted average productivity for the sectors supplying the construction sector. This group in particular is used to estimate the nation's aggregate productivity.

"National output" is the GNP of the nation in the baseline year (t4).

"National employment" is the number of employed persons in the nation in the same baseline year (t4).

The year t4 is the year in which the measurements of output and employment were made.

The year t4 is the base year the model will use to express all dollar-value quantities (productivity, wages, and income). The GNP input in this group is, by definition, in t4 dollars; other dollar-value inputs will be adjusted to t4 dollars by means of price deflator ratios. The data in this group are important enough to be determined and published frequently and promptly, so very current values can be expected to be available, allowing considerable discretion in the choice of the base year (t4), subject only to the availability of price deflators for the chosen year.

Currently, the model's technique for applying price deflators is rather limited and inflexible. Until this is corrected, the latest year that can be used as the base year is 1978. If it is important to obtain dollar-value outputs for a later year, the user may consider manually applying price deflators to the model's output.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

Survey of Current Business, U.S. Department of Commerce, Bureau of Economic Analysis, Monthly Publications.
Employment and Training Report of the President, U.S. Department of Labor, Annual Publications.

Example:

National Output (GNP) in Year t4: 199,530,000,000
National Employment in Year t4: 91,964,000
Date of Year t4: 1978

Section 1, Group 2 National Total Output and Employment, by Sector

Synopsis:

National output (GNP) in year t6: .....
National output (GNP) in year t6, by sector:
Manufacturing: .....
TCPU: .....
Trade: .....
FIRE: .....
Services: .....

National employment in year t6 . . . . . .
National employment in year t6, by sector:
Manufacturing: . . . . . .
TCPU: . . . . . .
Trade: . . . . . .
FIRE: . . . . . .
Services: . . . . . .
Date of year t6: . . . . . .

Description:

This group of inputs, along with groups 1 and 4 in this section, is used by the model to calculate a weighted average productivity for the sectors supplying the construction sector. This group in particular is used to estimate the nation's sectoral productivities.

"National output" is the GNP of the nation in the observation year (t6). The sectoral breakdown shows the portions of total national output provided by the indicated sectors.

"National employment" is the number of employed persons in the nation in the same observation year (t6). The sectoral breakdown shows the distribution of national employment by sector.

The year t6 is the year in which the measurements of output and employment were made.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

Survey of Current Business, U.S. Department of Commerce, Bureau of Economic Analysis, Monthly Publications.

Employment and Training Report of the President, U.S. Department of Labor, Annual Publications.

U.S. Department of Commerce, Bureau of Economic Analysis, *The Detailed Input-Output Structure of the U.S. Economy: 1972*, 1979.

Example:

National output (GNP)
in year t6: 1,887,177,000,000
National output (GNP) in year t6 by sector:
Manufacturing: 451,606,000,000
TCPU: 166,968,000,000
Trade: 325,909,000,000
FIRE: 261,493,000,000
Services: 233,972,000,000

National employment in year t6: 90,553,700
National employment in year t6, by sector:
Manufacturing: 19,559,220
TCPU: 4,589,500
Trade: 18,288,200
FIRE: 4,508,000
Services: 15,331,000
Date of year t6: 1977

Section 1, Group 3: National Employment and Income

Synopsis:

National employment in year tF: . . . . . .
National "wage and salary" income
in year tF: . . . . . .
National "other labor" income in year tF: . . . . . .
National proprietors' income in year tF: . . . . . .
Date of year t4: . . . . . .
Date of year tF: . . . . . .

Description:

The model uses the inputs in this group to calculate average personal income of workers and proprietors in the sectors supplying the construction sector. The calculation actually yields average personal income for all employees in the nation, and this figure is used as a proxy for the more specific value.

"National employment" is the number of employed persons in the nation (including proprietors) in the observation year (tF).

The income inputs are used to derive values of personal income, at the national level, among wages and salaries, labor income other than wages and salaries (e.g., commissions), and proprietors' income.

The year tF is the year in which the measurements of employment and income were made. The income values will be adjusted to t4 dollars by means of the ratio of the Consumer Price Indexes for the years t4 and tF.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

Survey of Current Business, U.S. Department of Commerce, Bureau of Economic Analysis, Monthly Publications.

Example:

National employment in year tF:	90,553,700
Nation "wage and salary" income in year tF:	983,642,000,000
National "other labor" income in year tF:	90,426,000,000
National proprietors' income in year tF:	99,767,000,000
Date of year t4:	1977
Date of year tF:	1977

Section 1, Group 4 Distribution of Construction Sector Expenditures

Synopsis:

% of construction sector expenditures going to labor income:	.....
% of construction sector expenditures going to property income:	.....
% of construction sector expenditures going to purchase from:	
Manufacturing:	.....
TCPU:	.....
Trade:	.....
FIRE:	.....
Services:	.....

Description:

The model uses this group of inputs, along with groups 1 and 2 in this section, to calculate a weighted average productivity for the sectors supplying the construction sector. This group provides the sectoral weights that will be applied to sectoral productivities to yield aggregate productivity.

These inputs show the fractional or percentage distribution of construction sector expenditures at the national level among wage income, property income, and purchases from other sectors.

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

U.S. Department of Commerce, Bureau of Economic Analysis, *The Detailed Input-Output Structure of the U.S. Economy: 1972*, 1979.

Example:

% of construction sector expenditures going to labor income:	.328
% of construction sector expenditures going to property income:	.093
% of construction sector expenditures going to purchases from:	
Manufacturing:	.393
TCPU:	.031
Trade:	.081
FIRE:	.015
Services:	.059

Section 1, Group 5 State or Regional Construction Sector Receipts and Employment

Synopsis:

State or regional construction sector:	
Receipts:	.....
Employment:	.....
Date:	.....

Description:

The model uses this group of inputs to calculate the construction sector's productivity.

"Receipts" refers to the dollar volume of new construction.

"Employment" refers to the number of persons employed in the construction sector.

"Date" is the year in which the measurements of receipts and employment were made.

Either the state or the region in which the ROI is located may be used as the geographic base, but the base should be the same for all three data values. The region selected must be large enough so that the incidence of employee commutation between the place of work and place of residence is minimized.

It always has been common practice to use state-level data for this sector.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

State Development Office.
State Department of Labor.
Regional/Local Planning Commission publication.

Example:

State or regional construction sector:
Receipts: 10,507,241,000
Employment: 310,343
Date: 1972

Section 1, Group 6 Wholesale Sector Receipts, Employment, and Payroll

Synopsis:

State or regional wholesale sector:
Output: . . . . . .
Employment: . . . . . .
Payroll: . . . . . .
Date: . . . . . .

Description:

This group of inputs, along with those of group 8 in this section, is used to estimate productivity and average wages in the aggregate wholesale trade and services sector. This aggregate sector is used as a proxy for the sectors supplying DOD procurement needs.

"Output" refers to the dollar volume of sales or receipts.

"Employment" is the number of persons employed in this sector.

"Payroll" is the total of wages paid to workers in this sector.

"Date" is the year in which output, employment, and payroll were measured.

Either the state or the region in which the ROI is located can be used as the geographic base, but the base should be the same for all three data values. If possible, the base should be the same as for groups 7 and 8. The region must be large enough so that the incidence of employee commutation between place of residence and place of work is minimized.

If the data for output, employment, and payroll are from different years, use the date of the employment data as the base and manually adjust the output and payroll data to that base using a ratio of wholesale price deflators (for output) or a ratio of consumer price indexes (for payroll).

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

State Development Office.
State Department of Labor.
Regional/Local Planning Commission publication.

Example:

State or regional wholesale sector:
Output: 207,775,000
Employment: 1573
Payroll: 9,470,000
Date: 1972

Section 1, Group 7 Retail Sector Receipts, Employment, and Payroll

Synopsis:

State or regional retail sector:
Output: . . . . . .
Employment: . . . . . .
Payroll: . . . . . .
Date: . . . . . .

Description:

This group of inputs, along with those of group 8 in this section, is used to estimate productivity and average wages in the aggregate retail trade and services sector. This aggregate sector is used as a proxy for the sectors supplying personal consumption.

"Output" refers to the dollar volume of sales or receipts.

"Employment" is the number of persons employed in this sector.

"Payroll" is the total of wages paid to workers in this sector.

"Date" is the year in which output, employment, and payroll were measured.

Either the state or the region in which the ROI is located can be used as the geographic base, but the base should be the same for all three data values. If possible, the base should be the same as for groups 6 and 8. The defined region should be large enough to minimize the effects of commuting between place of residence and place of work.

If the data for output, employment, and payroll are from different years, use the date of the employment data as the base and manually adjust the output and payroll data to that base using a ratio of retail price deflators (for output) or a ratio of consumer price indexes (for payroll).

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

State Development Office.
State Department of Labor.
Regional/Local Planning Commission.

Example:

State or regional retail sector:
Output: 175,824,000
Employment: 4523
Payroll: 19,224,000
Date: 1972

Section 1, Group 8–Service Sector Receipts, Employment, and Payroll

Synopsis:

State or regional service sector:
Output: .....
Employment: .....
Payroll: .....
Date: .....

Description

This group of inputs, along with those of groups 6 and 7 in this section, is used to estimate productivity and average wages in the aggregate retail trade and services sector (used as a proxy for the sectors supplying personal consumption) and in the aggregate wholesale trade and services sector (used as a proxy for the sectors supplying DOD procurement needs).

"Output" refers to the dollar volume of sales or receipts.

"Employment" is the number of persons employed in this sector.

"Payroll" is the total of wages paid to workers in this sector.

"Date" is the year in which the output, employment, and payroll were measured.

Either the state or the region in which the ROI is located can be used as the geographic base, but the base should be the same for all three data values. If possible, the base should be the same as for groups 6 and 7. The defined region should be large enough to minimize the effects of commuting between place of residence and place of work.

If the data for output, employment, and payroll are from different years, use the date of the employment data as the base and manually adjust the output and payroll data to that base using a ratio of service price deflators (for output) or a ratio of consumer price indexes (for payroll).

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

State Development Office.
State Department of Labor.
Regional/Local Planning Commission.

Example:

State or regional services sector:
Output: 27,110,000
Employment: 1569
Payroll: 6,339,000
Date: 1972

Section 2, Group 1 Income Multiplier

Synopsis:

ROI income multiplier: . . . . . .

Description:

This is the ROI net income multiplier, which is the ratio of nonbasic or "service" income to basic or "export" income. The gross income multiplier provided by EIFS is the ratio of total income to basic income. A gross multiplier may be converted readily to a net multiplier by subtracting one from the gross multiplier.

Sources:

Economic Impact Forecast System (EIFS) profile 8.

Example:

ROI income multiplier: 1335

Section 2, Group 2 ROI Labor Force

Synopsis:

Estimate of ROI labor force size
in year t2: . . . . . .
ROI labor force size in year t(Laz): . . . . . .
Date of t(Laz): . . . . . .
ROI labor force size in year t(Lbz): . . . . . .
Date of t(Lbz): . . . . . .

Description:

The inputs in this group are used to estimate the size of the ROI labor force at t2 (the end of the realignment period). The resultant value is an estimate of what the size of the ROI labor force would have been had no realignment been undertaken.

There are three options for supplying the required information:

1. The user may supply an estimate from local sources, such as a regional planning commission.

2. The model can interpolate the value from a measure of ROI labor force size at some period prior to t2 [referred to as t(Laz)], and from a measure of ROI labor force size at some period after t2 [referred to as t(Lbz)].

3. The model can extrapolate the value from two historical measures prior to t2 [the first referred to as t(Laz) and the second as t(Lbz)]. The technique used to extrapolate labor force size involves estimating the labor force participation rate at time t(Lbz), extrapolating the participation rate from t(Lbz) to t2, and combining the participation rate at t2 with the population at t2. The estimation of the participation rate t(Lbz) requires an estimation of population at t(Lbz). To make this population estimate, at least two population measures must be available; these can be obtained from the inputs of group 3 in this section. The extrapolation of participation rate from t(Lbz) to t2 is based on an assumption that the participation rate grows at the rate of .007 per year.

The first option is employed by supplying a value for the first input; the remaining inputs should then be given zero values. Either of the second or third options is taken by supplying a zero value for the first input, and non-zero values for the remaining inputs. The model compares the date t(Lbz) to t2 and decides whether to use the interpolation or the extrapolation algorithms.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

Economic Impact Forecast System (EIFS) BLS profile.
Bureau of Labor Statistics.
Regional/Local Planning Commission.
State Department of Labor.
Universities.

Example:

Estimate of ROI labor force size in year t2: 0
ROI labor force size in year t(Laz): 28,765
Date of t(Laz): 3/70
ROI labor force size in year t(Lbz): 38,507
Date of t(Lbz): 3/77

Section 2, Group 3- ROI Population

Synopsis:

Estimate of ROI population in year t2: . . . . . .
ROI population in year t(RPaz): . . . . . .
Date of t(RPaz): . . . . . .

ROI population in year t(RPbz): . . . . . .
Date of t(RPbz): . . . . . .

Description:

The inputs in this group are used to estimate the size of the ROI population at t2 (the end of the realignment period) in the absence of the realignment.

There are three options for supplying the required information:

1. The user may supply an estimate from local sources, such as a regional planning commission.

2. The model can interpolate the value from a measure of ROI population at some period prior to t2 [referred to as t(RPaz)], and from a measure of ROI population at some period after t2 [referred to as t(RPbz)].

3. The model can extrapolate the value from two historical measures prior to t2 [the first referred to as t(RPaz) and the second as t(RPbz)].

The first option is employed by supplying a value for the first input; the remaining inputs should then be given zero values. Either of the second or third options is taken by supplying a zero value for the first input and non-zero values for the remaining inputs. Currently, the interpolation and extrapolation algorithms for population are identical.

The technique used to extrapolate labor force size at the end of the realignment period (see group 2) requires estimates of population at t(RPaz) and t(RPbz) in order to estimate population at t(Lbz). If the extrapolation option in that group is taken, those population values must be supplied here even if option 1 is selected for estimating population in t2. In this case, values for all five inputs in this group must be entered; however, this will not adversely affect the t2 population estimate.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

Regional/Local Planning Commission.
State Department of Labor.
Universities.

Example

Estimate of ROI population in year t2: 0
ROI population in year t(RPaz): 74,792
Date of t(RPaz): 3/75
ROI population in year t(RPbz): 79,508
Date of t(RPbz): 3/80

Section 2, Group 4 ROI Unemployment Rate

Synopsis:

Estimate of unemployment rate in year t2: . . . . . .
Most recently recorded unemployment rate: . . . . . .
ROI unemployment rate for latest complete calendar year: . . . . . .
ROI unemployment rate 2 years before most recent year: . . . . . .
Most recent seasonally adjusted state unemployment rate: . . . . . .

Description:

The inputs in this group are used to calculate impacts on unemployment as a result of the realignment and to establish thresholds for the impact significance of the unemployment.

If the estimated unemployment rate at t2 is not available, the most recently recorded unemployment rate should be supplied.

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Sources:

Economic Impact Forecast System (EIFS) BLS profile.
Bureau of Labor Statistics.
Regional/Local Planning Commission.
State Department of Labor.

Gainer Model: The gainer model contains only one entry for this group:
Estimates of unemployment rate in year t2: . . . . . .

Example:

Estimate of unemployment rate in year t2: .035

Most recently recorded unemployment rate: .041
ROI unemployment rate for latest complete calendar year: .035
ROI unemployment rate 2 years before most recent year: .037
Most recent seasonally adjusted state unemployment rate: .053

Section 2, Group 5 ROI Unemployment Timeseries

Synopsis:

Number of years of unemployment rate data (uR, uN): .....
(for each year of unemployment rate data:)
Year: .....
ROI annual average unemployment rate: .....
State or regional unemployment rate: .....

Description:

The inputs in this group are used to establish thresholds for the impact significance of unemployment. They form a timeseries of unemployment rates in the ROI and in the state or region of the ROI's location.

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatially scaled by 100.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

Economic Impact Forecast System (EIFS) BLS profile.
Bureau of Labor Statistics.
Regional/Local Planning Commission.
State Department of Labor.

Example:

Number of years of unemployment rate data (UR, UN): 2
Year: 1976
ROI annual average unemployment rate: .035
State or regional unemployment rate: .053
Year: 1977
ROI annual average unemployment rate: .035
State or regional unemployment rate: .056

Section 2, Group 6 Regional Per Capita Income

Synopsis:

Regional per capita income in year tH
Date of year tH

Description:

These inputs are used to estimate personal income at time t2. The value of per capita income at time tH is adjusted to the base year (t4) by a ratio of consumer price indexes. The year tH should be the most recent year for which both per capita income data and price deflators are available.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

Survey of Current Business, U.S. Dept. of Commerce, Bureau of Economic Analysis, Annual Publications.
Economic Impact Forecast System (EIFS) BEA profile.
Regional/Local Planning Commission.

Example:

Regional per capita income in year tH: 6003
Date of year tH: 1976

Section 2, Group 7 Regional Income Timeseries

Synopsis:

Number of years of regional income data (Y, YL): .....
(for each year of regional income data:)
Year: .....
Total personal income: .....
Labor income: .....

Description:

These inputs provide a timeseries of total personal income and labor income, from which the model computes a ratio of non-wage income to total income.

These data are also used in income impact threshold computations.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

Survey of Current Business, U.S. Department of Commerce, Bureau of Economic Analysis, Monthly Publications.
Economic Impact Forecast System (EIFS) BEA profile.
Regional/Local Planning Commission.

Example:

Number of years of regional income data (Y, YL): 2
Year: 1970
Total personal income: 191,961,000
Labor income: 119,317,000
Year: 1971
Total personal income: 209,765,000
Labor income: 130,608,000

Section 3, Group 1 - Average Wages of DOD Personnel

Synopsis:

Average wages of DOD personnel affected by action:
Permanent military: . . . . . .
Military trainees: . . . . . .
Civilians: . . . . . .

Description:

These inputs are used to estimate the change in local spending due to change in DOD personnel income.

The input values should be annual wage and salary income for each class of DOD personnel.

Sources:

Base-Level Comptroller.
Commander's Management Information Review.

Example:

Average wages of DOD personnel affected by action:
Permanent military: 12,180
Military trainees: 5467
Civilian: 14,370

Section 3, Group 2 Fraction of DOD Personnel Disposable Income Spent in ROI

Synopsis:

% of DOD personnel disposable income spent in ROI:
Permanent military: . . . . . .
Military trainees: . . . . . .
Civilians: . . . . . .

Description:

These inputs are used to estimate the change in local spending due to change in DOD personnel income.

These inputs indicate the fraction of take-home pay spend in the ROI by each class of DOD personnel. Off-base military personnel spend an average of about 59 percent of their income in an ROI; on-base military personnel spend only an average of 51 percent of their income within the ROI. If the proportion of the military which resides on and off base is known, then a weighted average of 51 percent and 59 percent can be used as input. (If more reliable information can be gathered, it should be used.)

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Sources:

Surveys.
Knowledgeable personnel at the base level.
Historical surveys.

Example:

% of DOD personnel disposable income spent in ROI:
Permanent military: .55
Military trainees: .55
Civilians: .88

Section 3, Group 3 Working Dependents

Synopsis:

Average number of working dependents per DOD employee:

Civilian . . . . . .
Military . . . . . .
Working dependent full-time
equivalency factor: . . . . . .

Description:

These inputs are used to estimate the labor force impacts of vacated jobs due to dependents accompanying DOD personnel out of the ROI.

The first two inputs are the average number of working dependents per DOD personnel by type of personnel. The third input is a conversion factor representing the average full-time equivalency status of working dependents (1.0 equals full-time).

Sources:

Surveys.

Example:

Average number of working dependents per DOD employee:
Civilians: .37
Military: .25
Working dependent full-time equivalency factor: .50

Section 3, Group 4 - Second Jobs

Synopsis:

% of DOD personnel who hold a second job:
Civilian: . . . . . .
Military: . . . . . .
Second job full-time equivalency factor: . . . . . .

Description:

These inputs are used to estimate the labor force impacts of vacated second jobs held by DOD personnel who leave the ROI.

The first two inputs are percentages of each type of personnel who hold a second job. The third input is a conversion factor representing the average full-time equivalency status of second jobs (1.0 equals full-time).

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Sources:

Surveys.

Example:

% of DOD personnel who hold a second job:
Civilian: .11
Military: .10
Second job full-time equivalency factor: .25

Gainer Model: This group is removed.

Section 3, Group 5 Personnel Leaving ROI

Synopsis:

% of civilian retirees who leave ROI: . . . . . .
% of military retirees who leave ROI: . . . . . .
% of placed personnel who leave ROI: . . . . . .

Description:

These inputs are used to estimate impacts on population and local spending by DOD personnel.

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Example:

% of civilian retirees who leave ROI: .20
% of military retirees who leave ROI: .0
% of placed personnel who leave ROI: .60

Gainer Model: This group is removed.

Section 3, Group 6 –Personnel Leaving Labor Force

Synopsis:

% of civilian retirees who do not
seek work: . . . . . .
% of military retirees who do not
seek work: . . . . . .
% of separated personnel who
remain unemployed: . . . . . .

Description:

These inputs are used to estimate the labor force impacts resulting from DOD personnel who retire or separate.

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Example:

% of civilian retirees who do not seek work: .60
% of military retirees who do not seek work: .65
% of separated personnel who
remain unemployed: .50

Gainer Model: This group is removed.

Section 3, Group 7 Ratio of Non-Wage Income to Wage Income

Synopsis:

Ratio of non-wage income
to wage income: .....

Description:

This input is used to estimate the impacts of non-wage income losses to the ROI resulting from the proposed action. Non-wage income includes rent, interest, and dividends. If a zero value is given, the model calculates this value from the data in group 7 of section 2.

Example:

Ratio of non-wage income to wage income: 0

Gainer Model: This corresponding group is labeled group 4.

Section 3, Group 8 Taxes and Savings

Synopsis:

% of wages remaining after taxes: .....
% of after-tax wages remaining
after saving: .....

Description:

These inputs are used to estimate disposable income from gross income.

On the average, DOD personnel pay about 14 percent of their gross income for Federal, State, and local taxes; about 7 percent of after-tax income goes to savings.

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Example:

% of wages remaining after taxes: .86
% of after-tax wages remaining after saving: .93

Gainer Model: This corresponding group is labeled group 5

Section 3, Group 9 Fraction of Personnel Residing in ROI

Synopsis:

% of DOD personnel who currently
reside in ROI: .....

Description:

The input is used to calculate change in ROI population due to DOD personnel leaving the ROI. For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Sources:

Base Housing Office Survey.

Example:

% of DOD personnel who currently
reside in ROI: 1.00

Gainer Model: This group is removed.

Section 3, Group 10 Military Personnel Residing On-Base

Synopsis:

% of military personnel who live on-base:
Permanent military: .....
Military trainees: .....

Description:

These inputs are used to calculate population and housing impacts.

For percentage inputs, values less than or equal to

one will be interpreted as fractions and automatically scaled by 100.

Sources:

Base Housing Office Survey.

Example:

% of DOD military personnel who live on-base:
Permanent military: .29
Military trainees: .96

Gainer Model:

The inputs are changed to refer to available dormitory and family housing. This group is labeled group 6.

Synopsis for Gainer Model:

Number of on-base housing units available for new personnel: .....
Permanent parties (family housing): .....
Trainees (Dormitory units): .....

Section 3, Group 11–Number of On-Base Family Housing Units Occupied

Synopsis:

Number of on-base family housing units occupied at t1: .....

Description:

This input is used to calculate population and housing impacts.

Sources:

Base Housing Office Survey.

Example:

Number of on-base family housing units occupied at t1: 99

Gainer Model: This group is removed.

Section 3, Group 12 Housing Tenure of Off-Base Personnel

Synopsis:

% of DOD personnel living off-base who rent housing:
Permanent military: .....
Military trainees: .....
Civilians: .....

% of DOD personnel living off-base who own housing:
Permanent military: .....
Military trainees: .....
Civilians: .....

Description:

These inputs are used to calculate housing impacts.

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Sources:

Base Housing Office Survey.

Example:

% of DOD personnel living off-base who rent housing:
Permanent military: .40
Military trainees: 1.0
Civilians: .33

% of DOD personnel living off-base who own housing:
Permanent military: .60
Military trainees: 0
Civilians: .67

Gainer Model: This group is labeled group 7.

Section 3, Group 13 Mean Household Sizes of DOD Personnel

Synopsis:

Mean household size of DOD personnel:
Civilians: .....
Permanent military: .....
Military trainees: .....

Description:

These inputs are used to calculate population impacts.

The model is very sensitive to these inputs, and care should be taken when deriving the estimates.

Example:

Mean household size of DOD personnel:
Civilians: 2.86
Permanent military: 2.47
Military trainees: 1.06

Gainer Model: This group is labeled group 8.

Section 4, Group 1 Dates of Realignment Period

Synopsis:

Date of initiation of action: . . . . . .
Date of completion of action: . . . . . .

Description:

These two inputs define when the proposed action will begin (t1) and when it will be completed (t2). It always has been the practice to designate the date of initiation, rather than the date that the action physically commences, as the date of the proposed action's announcement.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Sources:

Description of Proposed Action and Alternatives (DOPAA).

Example:

Date of initiation of action: 2/78
Date of completion of action: 9/80

Section 4, Group 2–Total Terminated or Relocated Positions

Synopsis:

Total terminated or relocated positions: . . . . . .

Description:

This input shows the total number of affected positions at the installation (excluding contract employees located on-base).

Example:

Total terminated or relocated positions: 2581

Gainer Model:

The inputs are changed to show the "new" positions.

Synopsis for Gainer Model:

Total new positions opened at installation: . . . . . .

Section 4, Group 3–Disposition of Terminated Personnel

Synopsis:

% of terminated positions held by:
Permanent military who transfer: . . . . . .
Permanent military who retire: . . . . . .
Military trainees who transfer: . . . . . .
Civilians who transfer: . . . . . .
Civilians who retire: . . . . . .
Civilians who are placed by DOD: . . . . . .
Civilians who separate from DOD: . . . . . .

Description:

These inputs show the distribution of terminated or relocated positions by personnel type and disposition.

Civilian personnel may transfer with the realignment, retire, separate from DOD, or be placed elsewhere by DOD. Military permanent parties may either transfer with the realignment or retire. Military trainees are assumed to transfer with the realignment. Since the model does not recognize any other dispositions, the sum of the inputs for this group should equal one.

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Example:

% of terminated positions held by:
Permanent military who transfer: .39
Permanent military who retire: .04
Military trainees who transfer: .42
Civilians who transfer: .01
Civilians who retire: .02
Civilians who are placed by DOD: .09
Civilians who separate from DOD: .03

Gainer Model:

The input references to personnel retiring, separating, or being placed elsewhere have been replaced by those for local and nonlocal hires.

Synopsis for Gainer Model:

% of new positions filled by:
Permanent military who transfer: . . . . . .
Military trainees who transfer: . . . . . .
Civilians who transfer: . . . . . .
Civilians hired locally: . . . . . .
Civilians hired from outside ROI: . . . . . .

Section 4, Group 4 Change in Procurement Expenditures

Synopsis:

Change in procurement expenditures due to action: . . . . . .
Change in construction expenditures due to action: . . . . . .

Description:

These inputs show the change in procurement and construction expenditures resulting from the proposed action.

The model provides the user with the option either of supplying a value for change in procurement expenditures, or of having a value calculated from the inputs in group 5 of this section. A zero value for change in procurement expenditures will provide a calculated value.

Sources:

Base Procurement Office.

Example:

Change in procurement expenditures due to action: 4,236,570
Change in construction expenditures due to action: 150,000

Section 4, Group 5 Current Procurement Expenditures

Synopsis:

Current procurement expenditures: . . . . . .
Commissary and base exchange purchases by retirees: . . . . . .

Description:

These inputs are used to calculate a change in procurement expenditures when the user opts not to supply that input in group 4 of this section.

Sources:

Base Procurement Office.

Example:

Current procurement expenditures: 4,236,570
Commissary and base exchange purchases by retirees: 0

Section 5, Group 1 Personnel Currently Assigned to Installation

Synopsis:

Total personnel employed by/assigned to base: . . . . . .
Number of military personnel assigned to installation:
Military permanent parties: . . . . . .
Military trainees: . . . . . .

Description:

These inputs show the total assigned strength and employment at the affected installation (not including contract employees located on-base).

Sources:

Base Procurement Office.

Example:

Total personnel employed by/assigned to base: 2581
Number of military personnel assigned to installation:
Military permanent parties: 1120
Military trainees: 1075

Gainer Model:

The breakdown of current military personnel into permanent party and trainee has been removed. The single inputs ask for the total number of people currently at an installation.

Section 6, Group 1 Number of Cities in AOA Analysis

Synopsis:

Number of cities to be analyzed: . . . . . .

Description:

This input is used by both the model and the input procedure to control analysis of alternatives (AOA). Groups 2 through 7 in this section provide data for analysis of one AOA. Inputs for those groups must be repeated for each AOA. By specifying the number of AOAs in advance, the input procedure knows how many times to prompt for the AOA input groups.

The order in which groups 2 through 7 are prompted when several AOAs are to be analyzed is as follows: group 2 for AOA 1, group 3 for AOA 1, . . . , group 7 for AOA 1, group 2 for AOA 2, group 3 for AOA 2, . . . , group 7 for AOA 2, . . . , group 2 for AOA n, group 3 for AOA n, . . . , group 7 for AOA n.

Sources:

Not applicable.

Example:

Number of cities to be analyzed: 1

Section 6, Group 2 Name of City or AOA

Synopsis:

Name of city: . . . . . .

Description:

This input is used only to label the outputs from AOA analysis. The actual value supplied may be any short text describing the AOA.

Example:

Name of city: San Angelo

Section 6, Group 3–DOD Personnel Population in AOA

Synopsis:

Number of DOD personnel currently residing in this city:
Civilian: . . . . . .
Military: . . . . . .

Description:

The inputs in this group, with the addition of group 8 in this section, group 1 in section 5, and groups 9, 10, and 11 in section 3, are used to distribute the effects of DOD personnel migration among the AOAs.

Example:

Number of DOD personnel currently residing in this city:
Civilian: 381
Military: 2195

Gainer Model:

The input reflects the percentage of incoming personnel that will locate in this city.

Synopsis:

% of incoming personal locating in this city . . . . . .

Section 6, Group 4 AOA Population

Synopsis:

City population in year t(Paz): . . . . . .
Date of t(Paz): . . . . . .
City population in year t(Pbz): . . . . . .
Date of t(Pbz): . . . . . .

Description:

These inputs are used to estimate the AOA population at t2 (the end of the realignment period) in the absence of the realignment. These inputs either consist of historical measures of AOA population or are a mixture of historical measure and projection. The model will use simple trend-line fitting to extrapolate [if t(Pbz) is prior to t2] or interpolate [if t(Pbz) is after t2] population at t2.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Example:

City population in year t(Paz): 71,940
Date of t(Paz): 3/78

City population in year t(Pbz): 73,300
Date of t(Pbz): 3/80

Section 6, Group 5 AOA Population Timeseries

Synopsis:

Number of years of city population data: . . . . . .
(for each year of population data:)
City population: . . . . . .
Date: . . . . . .

Description:

These inputs are used to establish thresholds for population impact significance.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Example:

Number of years of city population data: 2
City population: 67,974
Date: 3/76
City population: 71,940
Date: 3/78

Section 6, Group 6–AOA Housing Stock Size

Synopsis:

City housing stock size in year t(Haz): . . . . . .
Date of t(Haz): . . . . . .
City housing stock size in year t(Hbz): . . . . . .
Date of t(Hbz): . . . . . .
Count of owned units in 1970: . . . . . .
Count of rental units in 1970: . . . . . .
Most recent count of owned units: . . . . . .
Most recent count of rental units: . . . . . .

Description:

These inputs are used to estimate the characteristics of the AOA housing stock at t2. The first four inputs consist of historical measures of housing stock size or a mixture of historical measure and projection. Housing stock size in t2 is either extrapolated [if t(Hbz) is prior to t2] or interpolated [if t(Hbz) is after t2] from these values.

The remaining inputs break down housing stock into owned and rental units.

Dates may be specified as a year (e.g., 1978), or as a year-within-century (e.g., 78). When more precision is required, a month number followed by a slash ("/") may precede the year (e.g., 1/78).

Example:

City housing stock size in year t(Haz): 23,807
Date of t(Haz): 3/70
City housing stock size in year t(Hbz): 23,927
Date of t(Hbz): 3/77
Count of owned units in 1970: 15,614
Count of rental units in 1970: 8193
Most recent count of owned units: 16,015
Most recent count of rental units: 7912

Section 6, Group 7 AOA Housing Vacancy Rates

Synopsis:

Latest total housing vacancy rate: . . . . . .
Most recent owned vacancy rate: . . . . . .
Most recent rental vacancy rate: . . . . . .

Description:

These inputs provide an estimate of housing vacancy rates in t2.

If values for the latter two inputs are available, the first input should be entered as zero. The model is equipped to perform housing impact calculations on the basis of either total vacancies or rental/owned vacancies. A non-zero input for total vacancy rate signals that the aggregate impact computation should be used.

For percentage inputs, values less than or equal to one will be interpreted as fractions and automatically scaled by 100.

Example:

Latest total housing vacancy rate: 0
Most recent owned vacancy rate: .038
Most recent rental vacancy rate: .068

Section 6, Group 8 DOD Personnel Population in Balance of ROI

Synopsis:

Number of DOD personnel currently residing in rest of ROI:
Civilian: . . . . . .
Military: . . . . . .

Description:

These inputs, with the addition of those in group 3 of this section, group 1 in section 5, and groups 9, 10, and 11 in section 3, are used to distribute the effects of DOD personnel migration among the AOAs.

Example:

Number of DOD personnel currently residing in rest of ROI:
Civilian: 5
Military: 0

Gainer Model: This group is removed.

9 OTHER METHODOLOGIES

While the EIFS/LECS hybrid approach addresses most needs of the DOD planner, the presentation of results often leads to the discussion of the EIFS/LECS methodologies and their relation to other commonly used models. In the adoption of LECS as the second tier, CERL has reviewed some prominent models relative to their application to current ETIS users. Subsequent paragraphs identify the major features of other prominent assessment methodologies and some of their inherent advantages and disadvantages. In some cases, the user's needs can best be met by combining the two-tier model with use of one or more other methodologies

Regional Industrial Multiplier System (RIMS)[14]

Researchers performing regional economic impact analyses often face impact alternatives in which only one or a few of the local industrial sectors are directly affected by a proposed project or action. For example, an irrigation project may be expected to increase the agricultural use of land in an area. Economists frequently use input-output (I-O) analysis to tackle this type of problem. Because input-output tables often are unavailable for the region of interest, out of date, and time-consuming and expensive to construct, most economic analysts either adopt the national input-output table for their use or use a table for a region whose economy appears similar to that of the locality of interest.

To provide economic impact analysts with relevant input-output multipliers at a reasonable cost and in a timely manner, economic researchers at the Bureau of Economic Analysis (BEA), U.S. Department of Commerce, and at the research firm of Regional Analytics in Santa Barbara, California, have developed the Regional Industrial Multiplier System (RIMS). RIMS calculates input-output multipliers for any multi-county area in the United States and for any four-digit Standard Industrial Classification (SIC). It should be emphasized that RIMS is not an economic model per se, but rather a methodology for estimating regional, industry-specific output multipliers which can be used to measure project impacts on output. From the output changes, changes in income and employment in a region due to the project or action can be estimated. RIMS was developed to provide regional economic impact analysts with the most relevant industry-specific impact multipliers.

Although RIMS obviates the necessity of constructing an input-output table, an understanding of input-output analysis and how RIMS multipliers are computed is desirable. An input-output table is a matrix partitioned into three sectors: a processing sector, a final demand sector, and a payments sector.* Figure 30 (Input-Output Table) shows a simplified structure of a complete input-output table. The northwest quadrant of an input-output table is called the processing sector, because it shows the production and consumption of goods and services by the industries within an economy. The processing sector is displayed as a square matrix (i.e., having an equal number of rows and columns): each column represents an industry purchasing its production requirements from other industries, and each row represents an industry selling its products to the other industries. An element in the processing sector shows the sales of a producing industry (row) to a purchasing industry (column). For example one element in the processing sector might represent sales of agricultural products to firms in the food processing industry.

The southwest quadrant is called the payments sector (or sometimes the value added sector), and it accounts for the compensation paid by the economy's industries for the services rendered by the owners of labor, capital, and other primary inputs. Besides imports, the payments sector includes industrial outlays

[14] *Industry-Specific Gross Output Multiplier for BEA Economic Areas*, Regional Economic Analysis Division, Bureau of Economic Analysis (U.S. Dept. of Commerce, January 1977).

*A fourth sector of the input-output table, where the payments sector and the final demand sector intersect, is usually omitted.

INPUT-OUTPUT TABLE

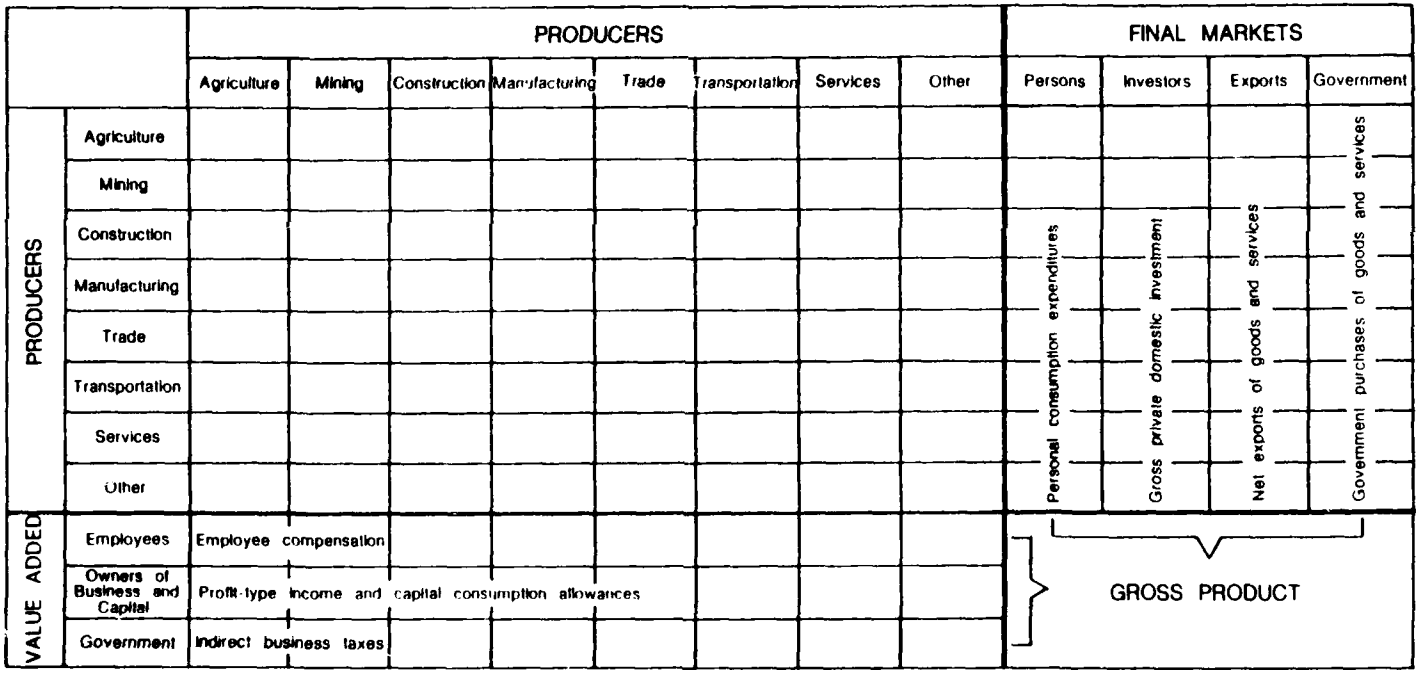

Figure 30. Input-output table. (From *Survey of Current Business*, Vol 54, No. 2 [U.S. Department of Commerce, Bureau of Economic Analysis, February 1974]).

for wages and salaries, taxes, depreciation allowances, rents, and profits. The northwest quadrant (known as the final demand sector) shows purchases by the final consumers of the economy, i.e., personal consumption, government purchases, investments, and exports.

After the input-output table has been constructed, a matrix of technical coefficients is developed from the processing sector. Each technical coefficient indicates the amount of inputs required from the row industry to produce one dollar's worth of output by the purchasing (column) industry. For a given industry, the entire column of technical coefficients represents the amount of inputs required from all other industries in the region to produce one dollar's worth of output from the given industry. The technical coefficients then provide the basis for calculating a multiplier for that industry.

The RIMS procedure for calculating industry-specific multipliers begins with the most recent BEA national input-output table. Starting with the assumption that the regional economy is similar, but not identical, to the national economy, the national input-output table is "regionalized." First, for a given industry, the column of technical coefficients is lifted from the national input-output table. Then, the coefficients are adjusted to reflect the operating level of each producing industry in the region relative to the industries' operating level at the national level. This is done by means of location quotients. For each industry, the location quotient indicates the extent to which the industry is more or less concentrated in the region than it is at the national level.

The BEA RIMS program uses four-digit SIC industrial earnings data by county, which is available at BEA. The version of RIMS produced by Regional Analytics uses four-digit SIC industrial employment data by county, which is available from the County Business Patterns data file. The location quotient for a hypothetical industry is calculated as follows:

$$LQ_i = \frac{\%\text{ of total regional earnings (or employment) in industry } i}{\%\text{ of total national earnings (or employment) in industry } i},$$

where LQ_i is the location quotient of industry i. If every region in the nation were self-sufficient and its economy had the same industrial structure as the nation's, the assumption is that it would have the same percentages of earnings (or employment) from each industry as the nation. Thus, a location quotient greater than one indicates that the region is more self-sufficient in that industry (i.e., is a net exporter of the industry's product) and a location quotient less than one indicates that the region is a net importer of that industry's product.

The RIMS procedure uses the location quotient for each industry to make the regional adjustments in the technical coefficients of the national input-output table. If the location quotient for a given industry is greater than or equal to one, it is assumed that any input required by the regional economy from that industry is available within the region and the corresponding technical coefficient is left unaltered. If the location quotient is less than one, it is assumed that the industry does not meet the regional demand for its product. Because the location quotient is a measure of the fraction of inputs available within the region, the corresponding technical coefficient is reduced by multiplying it by the location quotient.

Next, the industry's household coefficient (representing the earnings of households resulting from one dollar's worth of production of the industry's output) is moved from the payment sector into the processing sector, and the entire column of technical coefficients (including the household coefficient) is summed. The sum of the column's technical coefficients is called the direct component of the industry's output multiplier. The direct component indicates the value of the inputs required directly from local industries and households in order to elicit one dollar's worth of output from the producing industry.

Another component, the direct-induced component, is derived from the direct component, taking into consideration the economic size of the region and its industrial structure. The indirect-induced component represents the change in regional economic activity resulting from the change in industrial activity of the input industries and in the purchasing power of the households within the region.

Finally, the industry multiplier is equal to one plus the direct- and the indirect-induced components.

While the RIMS methodology does provide some sector-specific measures of impact, its applicability to the majority of EIFS applications is limited. The needs of this application are primarily for some "aggregate" estimate. This is currently obtained from EIFS with minimal input from the user. A large degree of this simplicity is due to the location quotient, export-

base technique selected for EIFS. RIMS requires sector-specific inputs for changes in local economic activity, amounting to some 67 values for procurement from each sector. For an "aggregate" measure, EIFS requires much less. In addition, RIMS currently does not address any impacts beyond employment and income changes, even though population, tax revenues, and other changes are major concerns. The EIFS/LECS hybrid (using the EIFS multiplier technique) addresses these other concerns.

The RIMS methodology has great potential for determining impacts where *sizable* change in the economic region is anticipated.

Bureau of Reclamation Economic Assessment Model (BREAM)[15]

The Bureau of Reclamation Economic Assessment Model (BREAM) was developed and implemented by Mountain West Research, Inc., at Tempe, AZ, for the Bureau of Reclamation, U.S. Department of the Interior. Its purpose is to assess and project the regional economic impacts that are due to construction sector projects that the Bureau of Reclamation undertakes. Like EIFS and LECS, BREAM is an economic base model, which means that a regional economy is divided into two sectors: the basic sector and the nonbasic sector. It assumes that the basic sector's activity depends on factors that are external to the region (e.g., exports). On the other hand, the nonbasic sector is assumed to depend on the basic sector for its demand.

The methodology for running BREAM is as follows. First, the user enters annual projections of both basic and nonbasic employment for the region. The model (i.e., BREAM) uses region-specific information, which also is entered by the user, to convert the basic and nonbasic employment projections into projections of income, population, labor force, migration, etc. This forms what is called a "baseline" projection, against which impacts are measured. Second, the user enters annual projections of basic and nonbasic employment impacts that result from a construction project. These impacts are computed by the user outside of the framework of BREAM. The basic employment impacts are the direct employment generated by the construction project. The nonbasic employment impacts are estimated by the user in any of a number of ways (e.g., economic base multipliers or input-output multipliers). Again, BREAM will make a projection of the region's income, population, labor force, etc., using the region-specific information. This is called an "impact" or "project alternative" projection. Finally, the "baseline" projection and the "impact" projection are compared. The difference between the two projections is the impact of the construction project.

Interrelationships among some of the most important components of BREAM are represented schematically in Figure 31 and are briefly described below. In the simplest terms, the model evaluates the consistency of the labor supply projections obtained from an analysis of the area's population, with the labor demand implied by an analysis of the area's economy. In the event that the supply and demand for labor are not in balance, adjustments are assumed to occur. The principal adjustment mechanism is migration, although some change in the number of unemployed can be expected. Once equilibrium is achieved in the labor market, no further migration occurs, and levels of population, employment, and income are established for each county in the local impact area. The model then disaggregates the county population projections and allocates them to the communities within each county.

Demographic Submodel

The principal input into the demographic submodel is county population, disaggregated by age and sex. Age- and sex-specific survival rates are applied to each group (i.e., each age/sex-specific group) to compute the effect of deaths on the county population. Age-specific fertility rates are then applied to the females in each age group to estimate the number of births. This procedure yields an estimate of what is referred to as the "survived" population of the county.

Further adjustments are made in the demographic submodel if there are special subpopulations with distinct demographic characteristics, or if there is migration into or out of the area related to factors independent of local labor market conditions (e.g., retirement migration).

Construction Worker Submodel

The construction worker submodel is used whenever some part of the construction labor force may have to emigrate to the study area because the project's labor demands exceed the supply available in the local labor market. Once the project manpower requirements have

[15] J. A. Chalmers and F. J. Anderson, *Bureau of Reclamation Economic Assessment Model (BREAM), Technical Documentation and User's Guide* (Engineering and Research Center, Bureau of Reclamation, Denver, January 1978).

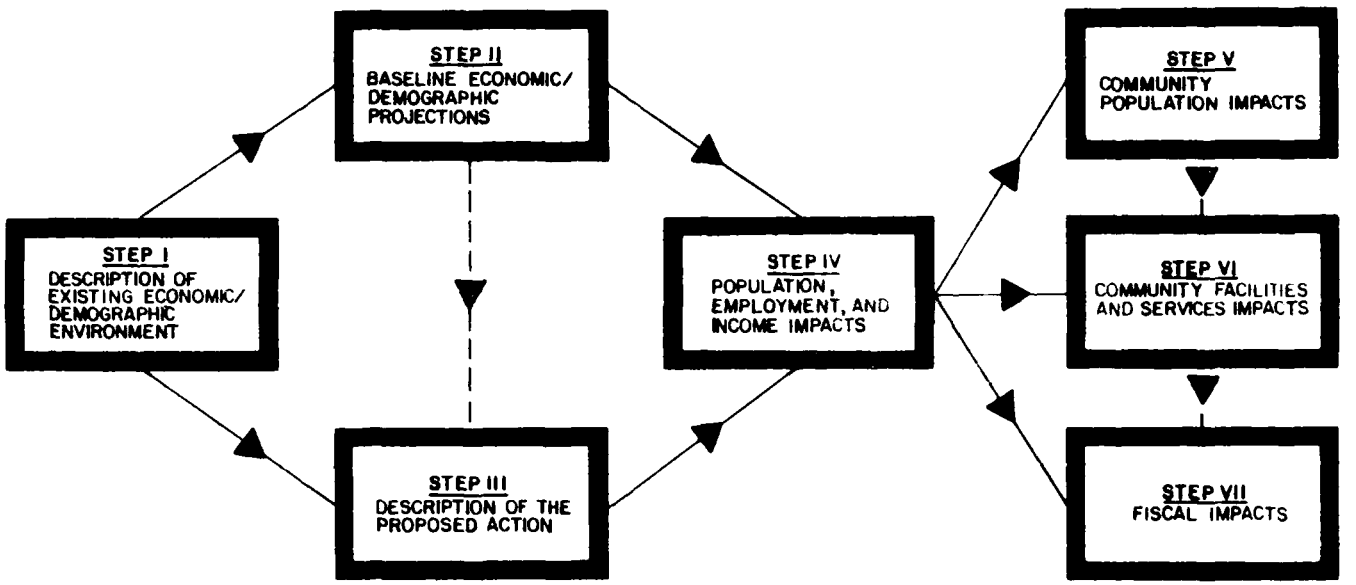

Figure 31. BREAM configuration.

been specified, the submodel determines the local/nonlocal composition of the construction force. After the number of nonlocal workers is determined (i.e., the number of immigrating workers), the construction worker submodel estimates the demographic characteristics of the workers and their families. It then estimates the number of married workers that will be accompanied by their families and estimates the community allocation of the immigrating workers.

Economic Submodel

The economic submodel is appropriately classified as an export base model which determines both income and employment. Economic activity is determined by basic labor income, which is derived by combining projections of basic employment with average earnings data. Once basic labor income is estimated, nonbasic labor income is estimated from nonbasic employment on personal income. Finally, personal income is calculated as the sum of basic labor income, nonbasic labor income, and nonlabor income, with nonlabor income partly endogenous and partly determined outside the model.

Thus, the employment and income projections are jointly determined. Basic employment and the exogenous components of personal income are user-specific and are entered as data. Nonbasic employment and total income are then determined as described above. Since nonbasic employment and personal income depend on each other, they are determined simultaneously using an iterative method.

Labor Market Submodel

The population calculated in the demographic submodel and the total employment estimate calculated in the economic submodel are the principal inputs into the labor force and migration process. The locally available supply of labor is calculated by applying age/sex-specific labor force participation rates to the population. Labor demand is estimated by multiplying the total employment figure from the economic submodel by an implied multiple job holding and commutation rate, resulting in what is called "adjusted employment." If the supply of labor is in balance with the demand for labor, no further adjustments are made to the population, employment, or income projections at the county level, and the model goes on to the community allocation process. If, however, there is an imbalance in the supply and demand for labor, in- or out-migration is assumed to occur until the imbalance is eliminated. Whenever migration occurs, it is necessary to iterate back through the demographic submodel so that the county population can be appropriately adjusted.

Community Allocation Submodel

Once equilibrium has been established in the local labor market, county totals for population, employment, and income are fixed. Then, the population must be allocated to communities within each county. School-age population for each community also is allocated, and the estimated number of households is determined. The population is allocated by a component of population change, which allows different allocation schemes to be used for natural increase (births-deaths), retirement migration, employment-related migration, and migration of nonlocal construction workers.

A significant conceptual improvement manifested in the BREAM system involves the development of some measure of intercounty dependence. This is accomplished through a measure of each county's ability to satisfy its own service needs and its necessary dependence on higher-level county units to account for deficits. This naturally produces a system of first-order, second-order, third-order, etc., counties, depending on service sector dependencies. This could help provide an adequate or functional definition of the region of influence (ROI). Additionally, if coupled with an I-O model of some type, a mechanism to estimate the effects of large buildings could be better addressed.

Socioeconomic Assessment Model (SEAM)[16]

The Socioeconomic Assessment Model (SEAM), administered by the Argonne National Laboratory, is very similar to BREAM. The concepts are closely aligned, with some refinement modifications.

10 CONCLUSIONS AND RECOMMENDATIONS

This report has described the two-tier concept for economic impact analysis. Instructions for using this concept were provided, and a brief discussion of other prominent methodologies was presented.

The EIFS/LFCS hybrid will provide a uniform two-tier approach to analysis of economic impacts associated with DOD activity. The similarity in ap

[16] *User's Guide, The Social and Economic Assessment Model (SEAM): A County Level Energy Facility Impact Assessment Model* (Argonne National Laboratory, Energy and Environmental Systems Division, April 1981).

proaches will insure continuity between the first tier (alternative analysis - EIFS) and the second tier (detailed documentation - LECS), using the RTV technique as a transition process. This approach will provide an easy, systematic procedure for impact evaluation early in the decision-making process and later allow for detailed, consistent analysis as more data become available. For this reason, this approach should be adopted to provide uniformity in economic impact studies in accordance with Executive Order 12049.

The review of other economic impact analysis methodologies has indicated that other needs (e.g., the need for relevant input-output multipliers) can be best addressed through a combination of the two-tier model and a RIMS/BREAM hybrid. For very large, sector-specific analysis, a system of this type would allow for the gradual modeling of a buildup (with appropriate calibration) by sector, making locational analysis and mitigation studies much more analytic in nature. This type of model should be adopted for projects where (1) alternative sectoral development is being studied (large public works projects, for example), or (2) the change in sectoral composition of the local economy will be significant (large military construction projects, for example).

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APPENDIX A: FORECAST MODEL EQUATIONS (VERSION 3.0)

CONSTRUCTION

$$\Delta EX_L = EX_c * P_L * \left(1 - \frac{1}{m}\right)$$

$$\Delta EX_m = EX_c * P_m * \left(1 - \frac{1}{m}\right)$$

$$\Delta EX_p = \Delta EX_L + \Delta EX_m$$

$$\Delta EX_H = F * R * 12$$

$$\Delta EX_o = F * Y_m * py_{OFF}$$

$$\Delta EX_T = \Delta EX_p - (\Delta EX_H + \Delta EX_o)$$

$$\Delta V_T = \Delta EX_T * M$$

$$\Delta V_I = \Delta V_T - \Delta EX_T$$

$$\Delta Y_p = \Delta EX_L + (\Delta V_T - \Delta EX_L) * v$$

$$\Delta C_H = \Delta Y_p * b_H$$

$$\Delta C_o = \Delta Y_p * b_o$$

$$\Delta PV = (\Delta V_T / V_T) * (AV/a)$$

$$\Delta I_H = (\Delta C_H - \Delta EX_H) * r * i_H$$

$$\Delta I_o = (\Delta C_o - \Delta EX_o) * i_o$$

$$\Delta EM_I = \Delta V_T / va$$

$$\Delta GR_T = (\Delta PV * t_p) + (\Delta V_T * t_s * pt_s)$$

$$\Delta S = -F * c * ps$$

$$\Delta GR_A = \Delta S * sc * (pa_F + pa_s)$$

$$\Delta GE_S = \Delta S * sc * (1 - pa_F - pa_s)$$

$$\Delta GE_o = (\Delta V_T / V_T) * GB$$

$$\Delta BE_T = \Delta GE_s + \Delta GE_o$$

MISSION CHANGE

$$\Delta EX_T = \Delta EX_S + (\Delta EM_c * Y_c) + (\Delta EM_m * Y_m * pr_p * py_{on}) + [\Delta EM_m * Y_m * (1 - pr_p) * (py_{OFF} + b_H)]$$

$$\Delta V_T = \Delta EX_T * M$$

$$\Delta V_I = \Delta V_T - \Delta EX_T$$

$$\alpha = [\Delta EM_m * (1 - pr_p) * (py_{OFF} + b_H) * Y_m] + \Delta EM_c * Y_c + (\Delta EM_m * pr_p * py_{ON} * Y_m)$$

$$\Delta Y_p = \alpha + (\Delta V_T - \alpha) * v$$

$$\Delta C_H = \Delta Y_p * b_H$$

$$\Delta C_o = \Delta Y_p * b_o$$

$$\Delta EM_I = \Delta V_T / va$$

$$\Delta PV = (\Delta V_T / V_T) * (AV/a)$$

$$\Delta I_H = \Delta C_H * r * i_H$$

$$\Delta I_o = \Delta C_o * i_o$$

$$\Delta GR_T = (\Delta PV * t_p) + (\Delta V_T * t_s * pt_s)$$

$$\Delta S = \Delta EM_s + \Delta EM_m * (1 - pr_p) * c * ps$$

$$\Delta GR_A = \Delta S * sc * (pa_F + pa_s)$$

$$\Delta GE_S = \Delta S * sc * (1 - pa_F - pa_s)$$

$$\Delta GE_o = (\Delta V_T / V_T) * B$$

$$\Delta GE_T = \Delta GE_s + \Delta GE_o$$

OPERATIONS AND MAINTENANCE

$$\Delta EX_T = \Delta EX_S + (\Delta EM_c * Y_c) + (\Delta EM_m * pr_p * Y_m * py_{ON}) + [\Delta EM_m * (1 - pr_p) * Y_m * (py_{OFF} - b_H)]$$

$$\Delta V_T = \Delta EX_T * M$$

$$\Delta V_I = \Delta V_T - \Delta EX_T$$

$$\Delta Y_p = (\Delta EM_c * Y_c) + [\Delta EM_m * (1 - pr_p) * Y_m] + \Delta V_T - (\Delta EM_c * Y_c) - [\Delta EM_m * (1 - pr_p) * Y_m] * v$$

$$\Delta C_H = \Delta Y_p * b_H$$

$$\Delta C_o = \Delta Y_p * b_o$$

$$\Delta EM_I = \Delta V_T / va$$

$$\Delta PV = (\Delta V_T / V_T) * (AV/a)$$

$$\Delta I_H = \Delta C_H * r * i_H$$

$$\Delta I_o = \Delta C_o * i_o$$

$$\Delta GR_T = (\Delta PV * t_p) + (\Delta V_T * t_s * pt_s)$$

$$\Delta S = \Delta EM_m * (1 - pr_p) * c * ps$$

$$\Delta GR_A = \Delta S * sc * (pa_F + pa_s)$$

$$\Delta GE_S = \Delta S * sc * (1 - pa_F - pa_s)$$

$$\Delta GE_o = (\Delta V_T / V_T) * B$$

$$\Delta GE_T = \Delta GE_S + \Delta GE_o$$

TRAINING

$$\Delta EX_L = \Delta EX_s * 1 * \left(1 - \frac{1}{m}\right)$$

$$\Delta EX_m = \Delta EX_s * (1 - 1) * \left(1 - \frac{1}{m}\right)$$

$$\Delta EX_P = \Delta EX_L + \Delta EX_m$$

$$\Delta EX_T = \Delta EX_P + (\Delta EM_T * pr_T * Y_T * py_{ON}) + [\Delta EM_T(1 - pr_T) * Y_T * (py_{OFF} + b_H)] + (\Delta EM_c * Y_c)$$

$$\Delta V_T = \Delta EX_T * M$$

$$\Delta V_I = \Delta V_T - \Delta EX_T$$

$$\alpha = \Delta EM_T * (1 - pr_T) * Y_T * (py_{OFF} + b_H)$$

$$\Delta Y_P = \alpha + (\Delta V_T - \alpha) * v$$

$$\Delta C_H = \Delta Y_P * b_H$$

$$\Delta C_o = \Delta Y_P * b_o$$

$$\Delta EM_I = \Delta V_T / va$$

$$\Delta PV = (\Delta V_T / V_T)(AV/a)$$

$$\Delta I_H = \Delta C_H * r * i_H$$

$$\Delta I_o = \Delta C_o * i_o$$

$$\Delta GR_T = (\Delta PV * t_p) + (\Delta V_T * t_s * pt_s)$$

$$\Delta S = [\Delta EM_m * (1 - pr_p) + \Delta EM_T * (1 - pr_T)] * c * ps$$

$$\Delta GR_A = \Delta S * sc * (pa_F + pa_s)$$

$$\Delta GE_S = \Delta S * sc * (1 - pa_F - pa_s)$$

$$\Delta GE_o = (\Delta V_T / V_T) * B$$

$$\Delta GE_T = \Delta GE_S + GE_o$$

USER INPUT VARIABLES

ΔEM_c	Change in the number of civilian employees
ΔEM_m	Change in the number of permanent-party military personnel that move on-post from the surrounding community as a result of housing construction on-post
ΔEM_T	Change in the number of non-basic trainees
ΔEX_c	Total dollar value of the housing construction project
ΔEX_s	Total dollar value of local expenditures for supplies and services necessary to support an activity being assessed
F	Number of families moving on-post from the surrounding community as a result of housing construction on-post
l	Labor's share (%) of local expenditures for a project
pr_p	Percent (%) of permanent-party military personnel residing on-post
pr_T	Percent (%) of non-basic trainees residing on-post
Y_c	Average income of civilian employees
Y_m	Average income of military personnel
Y_T	Average income of non-basic trainees
a	The assessed to market value ratio was obtained from the 1972 *Census of Governments*. A

regional value was obtained by the following relation:

$$a_R = \frac{\Sigma TV_c \cdot}{\Sigma(TV_c \cdot a_c)} \qquad \text{[Eq A1]}$$

where R designates region and c designates a county value.

GB — The county operating budget, excluding education, was obtained from the 1972 *Census of Governments*. County-area educational expenditures were subtracted from the county-area direct general expenditures. A regional value was obtained by summation.

c — The number of children per family was obtained by comparing dependency statistics from the *1974 Military Markets Facts Book* with statistical census data to determine the average U.S. family size. The results were comparable. For the present EIFS, an average value of 1.5 children per family was used, although eventually, statistics differentiating between married/unmarried and dependents will be available.

sr — The cost of education per child was obtained from the Office of Education, Department of Health, Education, and Welfare. It is the expenditure per pupil in average daily attendance in public and secondary day schools, by state, for 1972–1973.

b_H — The average propensity to consume for housing was obtained by analyzing several sources:

(1) *The 1967 Market Profiles of Consumer Products*, prepared by the National Industries Conference Board.

(2) *The 1976 Federal Employees Almanac*, published by *Federal Employees News Digest*.

(3) *The 1974 Military Market Facts Books*, published by the editors of *Army Times Magazine*.

(4) *1975 Selected Manpower Statistics*, published by the Department of Defense.

A breakdown of consumer expenditure statistics was analyzed and compared to the job grade-level distribution of DA. There was little variation in the "h" figure for differing salary levels other than those which were very low. For this reason, an overall value of 0.16 is currently used in EIFS. This corresponds to statistics available in the Strategic Air Command Manual 173-661, *Salary Impact Report, (B3500)* (March 1975).

i_m — The propensity to invest in housing was obtained by reviewing:

(1) *The 1967 Annual Statistical Summary*, published by the Department of Housing and Urban Development (HUD).

(2) *The HUD Statistical Yearbook*.

An average value of 0.06 is currently used.

i_o — Propensity to invest in nonhousing was obtained by analyzing:

(1) *The 1967 Annual Statistical Summary*, published by HUD.

(2) The U.S. Internal Revenue Service (IRS) *Statistics of Income–Business Income*.

The general value of 0.12 is currently used.

ΔV_I — The induced business volume accounts for the secondary and cumulative effects of the action.

M — The export-employment multiplier is the basis of all EIFS estimates in the current version. The location quotient technique has historically produced gross overestimates of the multiplier. Most work, however, has used a highly aggregated breakdown of employment. The previous EIFS used 40 categories of employment. A new technique being developed at CERL uses a less aggregated employment profile.

Depending on the region being studied, as many as 800 employment categories can be used. Preliminary analysis of EIFS indicates the development of a much more reasonable multiplier. Additionally, the CERL technique modifies the true location quotient method by treating Federal government and tourist and hotel employment as exports; these data are currently obtained from the 1972 County Business Patterns tapes.

b_o The average propensity to consume for non-housing was developed through the same analysis as the average propensity to consume for housing (h). An average value of 0.63 is currently used in EIFS.

l_p The property tax rate was obtained by dividing the regional property tax revenues by the regional value of locally assessed real property value (available from the *1972 Census of Governments*). Simple summations aggregated county-specific figures into regional values.

ps The percent attending school figure is the ratio of school children to the total number of persons under 18 years of age. Data for this value were obtained from the *1970 Census of Population*. The total number of children under 18 years of age attending school was divided by the total population under 18 years of age. Regional statistics are obtained by summing the county-specific data.

pa_F The percent of total educational expense paid by Federal funds, by state, was obtained from the Governments Division of the U.S. Bureau of the Census, *State and Local Expenditure for Local Schools by Governmental Source of Financing by State*, 1969-70.

P_m The percent materials figure for allocation of construction dollars was obtained from construction records for the percentages of materials spent for masonry, steel, concrete, labor, etc. The proportion purchased locally was obtained for each major category by assuming that masonry, concrete, and wood materials would be purchased locally. These are stored by major construction category and are assessed by user response in the Construction Functional Area.

T_L The percent labor figure is based on construction data available by category. It is treated similarly to data used for percent material (P_M).

pt_s Percent of sales tax retained locally, by state, was obtained from the Commerce Clearing House *State Tax Guide–Sales Tax Rate*.

pa_s Percent of total educational expense paid by State funds was obtained from the same source as analysis of the Federal proportion (P_F).

py_{off} The percent spent locally figure was obtained by studying the same sources used to find the average consumption propensities (o and h). Proximity of certain PX and commissary facilities was considered, and some items were deleted from the overall average figure. The value 0.335 is currently used in EIFS.

py_{on} This variable is treated like P_{SL} until better statistics become available.

R Average rent was calculated by dividing the total regional rental receipts by the number of renters in the region. Both are available from the *1970 Census of Population*. Regional values are summations of county statistics.

r The constant relating rental incomes to value of rental properties was obtained by analyzing statistics from the *1972 Census of Governments*, "Taxable Ratio of Rental to Housing Value." An overall average value of 7.75 was used.

t_s The state sales tax was obtained from the records of the Analysis Staff, Tax Division of the Treasury Department, as of July 1, 1974.

V_T Total business volume was calculated from statistics available from the *1972 Census of Business*. Four components were summed:

(1) Total retail trade receipts

(2) Total wholesale sales

(3) Total selected services receipts

(4) Value added by manufacture.

AV Total assessed value of real property was obtained directly from the *1972 Census of Governments* and summed.

va The regional value added per employee was obtained from two sets of statistics: the employment profile from the *1970 Census of Population* and value-added figures from the *1972 Census of Business*. The calculation was basically as follows:

Total employment for each employment category was a sum of county statistics. The over-

all regional value-added figure is derived from the following equation:

$$Va = \frac{\sum_{i=1}^{41}(E \cdot V)}{\sum_{i=1}^{41} E} \qquad \text{[Eq A2]}$$

where E = the employment by category and
V = the average value added by employee figured for that particular category.

υ The constant relating change in personal income to change in business volume was calculated using historical data on personal income and business volume as follows:

$$\upsilon = \frac{P_{72} - P_{67}}{T_{72} - T_{67}} \qquad \text{[Eq A3]}$$

where P_{72} = personal income for 1972
P_{67} = personal income for 1967
T_{67} = total business volume for 1967
T_{72} = total business volume for 1972
P_{67} and P_{72} were obtained from BEA. T_{67} and T_{72} were obtained from the 1972 Census of Business.

DEFINITIONS

a Assessed to market value ratio for houses (I)

AV Assessed value of real property (I)

b_H Average propensity to consume housing (I)

b_o Average propensity to consume non-housing goods and services (I)

c Average number of children per family (I)

ΔC_H Induced personal expenditures for housing (O)

ΔC_o Induced personal expenditures for non-housing goods and services (O)

ΔEM_c Change in the number of civilian employees (U)

ΔEM_I Induced local employment (O)

ΔEM_M Change in the number of permanent part-time military personnel (U)

ΔEM_T Change in the number of non-basic trainees (U)

ΔEX_c Dollar volume of the housing construction project (U)

ΔEX_H Local housing expenditures of military families moving on-post (O)

ΔEX_L Local labor expenditures for the project (I)

ΔEX_M Local non-labor expenditures (i.e., materials) for the project (I)

ΔEX_o Local non-housing expenditures of military families moving on-post (O)

ΔEX_p Local expenditures for a project (I)

ΔEX_s Local expenditures for supplies and services (U)

ΔEX_T Total local expenditures attributable to a project (I)

F The number of military families moving on-post as a result of housing construction (U)

GB Local government operating budget for non-educational expenditures (I)

ΔGE_s Change in local government educational expenditures (O)

ΔGE_o Change in local government non-educational expenditures (O)

ΔGE_T Change in total expenditures of local government (O)

ΔGR_A Change in State and Federal aid for education (O)

ΔGR_T Change in tax-related revenues for local government (O)

i_H Average propensity to invest in housing (I)

i_o Average propensity to invest in non-housing opportunities (I)

ΔI_H Change in housing investment (O)

ΔI_o Change in non-housing investment (O)

l	Labor share (%) of local expenditures for a project (U)
M	Export employment multiplier (I)
P_L	Local labor's share (%) of expenditures for the housing construction project (I)
P_M	Local material's share (%) of expenditures for the housing construction project (I)
pa_F	Share (%) of local education expenditures financed by Federal aid (I)
pa_S	Share (%) of local education expenditures financed by State aid (I)
pr_p	Percent (%) of permanent-party military personnel residing on-post (U)
pr_T	Percent (%) of non-basic trainees residing on-post (U)
ps	Percent (%) of children attending public schools (I)
pt_s	Percent (%) of sales tax that is retained locally (I)
py_{off}	Percent (%) of income spent locally by military personnel residing off-post (I)
py_{on}	Percent (%) of income spent locally by military personnel residing on-post (I)
ΔPV	Change in local property values (O)
r	A numeric constant relating rental income to property value (I)
R	Average monthly rent paid by military personnel moving on-post and into newly constructed housing (I)
sc	Cost of local education per child (I)
ΔS	Change in the number of school children (O)
t_p	Local property tax rate (I)
t_s	State sales tax rate (I)
va	Value added per employee (I)
V_T	Total business volume (I)
ΔV_I	Induced business volume (O)
ΔV_T	Change in total business volume (O)
Y_c	Average income of civilian employees (U)
Y_m	Average income of military employees (U)
Y_T	Average income of military trainees (U)
ΔY_p	Change in local personal income (O)
α	Direct change in personal income (I)
υ	A numeric constant relating the total change in personal income to a change in business volume (I)

Notes:

(U) User input
(O) Model input
(I) Internally supplied data

APPENDIX B: LECS DATA REQUIREMENTS

LECS' user input requirements are much more extensive than those of EIFS. LECS also requires new software techniques so that users can make successive runs without having to duplicate extensive input. The input of more extensive data and the increase in the commitment of resources by the user significantly improve the quality and sensitivity of the projected impacts.

One problem common to all models is the adequacy of the database; for example, the timeliness of the data and the lack of inputs for a designated time period (i.e., the "baseline" period). LECS addresses problems by adding a time-adjustment factor to the model analysis by means of price deflator ratios. This factor allows users to adjust all dollar impacts to a given baseline year and account for inflation.

The LECS model requires national, state, and local inputs. All input data are entered manually into the LECS input file. (Many of the required inputs are now available in the EIFS data base.) There are three categories of LECS input requirements:

1. Currently available in the EIFS data base
2. Programmed for inclusion into the EIFS data base
3. Available only from primary sources.

Data Requirements for LECS

Table B1 summarizes current LECS data requirements; the following symbols are used in the table:

A - Already available in EIFS

B - Programmed for inclusion in EIFS

C - Primary sources only.

The data elements fall into the following categories:

1. Available in tape format
2. Unavailable in tape format
3. Universal constants or default values.

Data elements available in tape format can be updated easily, since they need not be processed to become "machine-readable." This is very advantageous for county- (3600 units) or tract-level data (40,000 units). The drawback of this method is the lack of timeliness (data elements are often limited to those obtained from the Department of Commerce).

Data unavailable in tape format will often require case-specific acquisition and input by the LECS user. The acquisition and input of this data by hard-copy means for all areas will almost always be cost-prohibitive.

In order to run the LECS methodology, some of the input requirements can be met through the use of regional or national data. These data can serve as "default values," allowing the user to proceed with analysis, recognizing that the data are not case-specific.

Table B1
Current LECS Data Requirements

SECTION 1	
Group A	
National Output (GNP) in Year t4:	B
National Employment in Year t4:	B
Date of Year t4:	B
Group B	
National Output (GNP) in Year t6:	B
National Output (GNP) in Year t6, by Sector:	B
Manufacturing:	B
TCPU:	B
Trade:	B
Fire:	B
Services:	B

Table B1 (cont'd.)

National Employment in Year t6:	B
National Employment in Year t6, by Sector:	B
Manufacturing:	B
TCPU:	B
Trade:	B
Fire:	B
Services:	B
Date of Year t6:	B
Group C	
National Employment in Year t5:	B (1977)
National Wage and Salary Income in Year t5:	B (1977)
National Other Labor Income in Year t5:	B (1977)
National Proprietors Income in Year t5:	B (1977)
Date of Year t5:	
Group D	
% of Construction Sector Expenditures Going to Labor Income:	C
% of Construction Sector Expenditures Going to Property Income:	C
% of Construction Sector Expenditures Going to Purchases From:	
Manufacturing:	C
TCPU:	C
Trade:	C
Fire:	C
Services:	C
Group E	
State or Regional Construction Sector:	
Receipts:	B (1977)
Employment:	B (1977)
Date:	B (1977)
Group F	
State or Regional Wholesale Sector:	
Output:	B (1977)
Employment:	B (1977)
Payroll:	B (1977)
Date:	B (1977)
Group G	
State or Regional Retail Sector:	
Output:	B (1977)
Employment:	B (1977)
Payroll:	B (1977)
Date:	B (1977)
Group H	
State or Regional Service Sector:	
Output:	B (1977)
Employment:	B (1977)
Payroll:	B (1977)
Date:	B (1977)

Table B1 (cont'd.)

SECTION 2

Group A	
ROI Income Multiplier:	A (1972)(soon 1977)
Group B	
Estimate of ROI Labor Force Size in Year t2:	C
ROI Labor Force Size in Year t (LAZ):	A (1978)
Date of t (LAZ):	A (1978)
ROI Labor Force Size in Year t (LBZ):	A (1978)
Date of t (LBZ):	A (1978)
Group C	
Estimate of ROI Population in Year t2:	A (1975)(soon 1977) (1979–1984 Estimates)
ROI Population in Year t(RPaz):	A (1975)
Date of t(RPaz):	A (1975)
ROI Population in Year t(RPbz):	A (1975)
Date of t(RPbz):	A (1975)
Group D	
Estimate of Unemployment Rate in Year t2:	C
Most Recently Recorded Unemployment Rate:	A (1978)
ROI Unemployment Rate for Latest Complete Calendar Year:	A (1978)
ROI Unemployment Rate 2 Years Before Most Recent:	A (1978)
Most Recent Sesonally Adjusted State Unemployment Rate:	B (1978)
Group E	
Number of Years of Unemployment Rate Data (EE, FN)	A (1975–1978)
(For Each Year of Unemployment Rate Data):	
Year (1):	A (1975–1978)
ROI Annual Average Unemployment Rate:	A (1975–1978)
State or Regional Unemployment Rate:	A (1975–1978)
Year (2):	A (1975–1978)
ROI Annual Average Unemployment Rate:	A (1975–1978)
State or Regional Unemployment Rate:	A (1975–1978)
Year (3):	A (1975–1978)
ROI Annual Average Unemployment Rate:	A (1975–1978)
State or Regional Unemployment Rate:	A (1975–1978)
Year (4):	A (1975–1978)
ROI Annual Average Unemployment Rate:	A (1975–1978)
State or Regional Unemployment Rate:	A (1975–1978)
Year (5):	A (1975–1978)
ROI Annual Average Unemployment Rate:	A (1975–1978)
State or Regional Unemployment Rate:	A (1975–1978)
Year (6):	A (1975–1978)
ROI Annual Average Unemployment Rate:	A (1975–1978)
State or Regional Unemployment Rate:	A (1975–1978)
Year (7):	A (1975–1978)
ROI Annual Average Unemployment Rate:	A (1975–1978)
State or Regional Unemployment Rate:	A (1975–1978)
Year (8):	A (1975–1978)
ROI Annual Average Unemployment Rate:	A (1975–1978)
State or Regional Unemployment Rate:	A (1975–1978)
Year (9):	A (1975–1978)
ROI Annual Average Unemployment Rate:	A (1975–1978)
State or Regional Unemployment Rate:	A (1975–1978)
Year (10):	A (1975–1978)
ROI Annual Average Unemployment Rate:	A (1975–1978)

Table B1 (cont'd.)

Group I

Regional Per Capita Income in Year tH:	A (1975) (Soon 1977) (1979-1984 Estimates)
Date of Year tH	A (1975) (Soon 1977)

Group G

Number of Years of Regional Income	
Date (Y, YE)	A (1965-1975)(Soon 1965-1977)
(For Each Year of Regional Income Data)	
Year (1):	A (1965-1975)(Soon 1965-1977)
Total Personal Income:	A (1965-1976)(Soon 1965-1977)
Labor Income:	A (1965-1976)(Soon 1965-1977)
Year (2):	A (1965-1976)(Soon 1965-1977)
Total Personal Income:	A (1965-1976)(Soon 1965-1977)
Labor Income:	A (1965-1976)(Soon 1965-1977)
Year (3):	A (1965-1976)(Soon 1965-1977)
Total Personal Income:	A (1965-1976)(Soon 1965-1977)
Labor Income:	A (1965-1976)(Soon 1965-1977)
Year (4):	A (1965-1976)(Soon 1965-1977)
Total Personal Income:	A (1965-1976)(Soon 1965-1977)
Labor Income:	A (1965-1976)(Soon 1965-1977)
Year (5):	A (1965-1976)(Soon 1965-1977)
Total Personal Income:	A (1965-1976)(Soon 1965-1977)
Labor Income:	A (1965-1976)(Soon 1965-1977)
Year (6):	A (1965-1976)(Soon 1965-1977)
Total Personal Income:	A (1965-1976)(Soon 1965-1977)
Labor Income:	A (1965-1976)(Soon 1965-1977)
Year (7):	A (1965-1976)(Soon 1965-1977)
Total Personal Income:	A (1965-1976)(Soon 1965-1977)
Labor Income:	A (1965-1976)(Soon 1965-1977)
Year (8):	A (1965-1976)(Soon 1965-1977)
Total Personal Income:	A (1965-1976)(Soon 1965-1977)
Labor Income:	A (1965-1976)(Soon 1965-1977)
Year (9):	A (1965-1976)(Soon 1965-1977)
Total Personal Income:	A (1965-1976)(Soon 1965-1977)
Labor Income:	A (1965-1976)(Soon 1965-1977)
Year (10):	A (1965-1976)(Soon 1965-1977)
Total Personal Income:	A (1965-1976)(Soon 1965-1977)
Labor Income:	A (1965-1976)(Soon 1965-1977)

SECTION 3

Group A

Average Wages of DOD Personnel Affected by Action:	C (User Input)
Permanent Military:	C (User Input)
Military Trainees:	C (User Input)
Civilians:	C (User Input)

Group B

% of DOD Personnel Disposable Income Spent in ROI:	C (User Input)
Permanent Military:	C (User Input)
Military Trainees:	C (User Input)
Civilians:	C (User Input)

Group C

Average Number of Working Dependents Per DOD Employee:	C (User Input)
Civilian:	C (User Input)
Military:	C (User Input)
Working Dependent Full-Time Equivalency Factor:	C (User Input)

Table B1 (cont'd.)

Group D	
% of DOD Personnel Who Hold a Second Job:	C (User Input)
Civilian:	C (User Input)
Military:	C (User Input)
Second Job Full-Time Equivalency Factor:	
Group E	
% Civilian Retirees Who Leave ROI:	C (User Input)
% Military Retirees Who Leave ROI:	C (User Input)
% Placed Personnel Who Leave ROI:	C (User Input)
Group F	
% Civilian Retirees Who Do No Seek Work:	C (User Input)
% Military Retirees Who Do Not Seek Work:	C (User Input)
% Separated Personnel Who Remain Unemployed:	C (User Input)
Group G	
Ratio of Non-Wage Income to Wage Income:	C (User Input)
Group H	
% of Wages Remaining After Taxes:	C (User Input)
% of After-Tax Wages Remaining After Saving:	C (User Input)
Group I	
% of DOD Personnel Who Currently Reside in ROI:	C (User Input)
Group J	
% of DOD Military Personnel Who Live On-Base:	C (User Input)
Permanent Military:	C (User Input)
Military Trainees:	C (User Input)
Group K	
Number of On-Base Family Housing Units Occupied at t1:	C (User Input)
Group L	
% of DOD Personnel Living Off-Base Who	
Rent Housing:	C (User Input)
Permanent Military:	C (User Input)
Military Trainees:	C (User Input)
Civilians:	C (User Input)
% of DOD Personnel Living Off-Base Who	
Own Housing:	C (User Input)
Permanent Military:	C (User Input)
Military Trainees:	C (User Input)
Civilians:	C (User Input)
Group M	
Mean Household Size of DOD Personnel:	C (User Input)
Civilians:	C (User Input)
Permanent Military:	C (User Input)
Military Trainees:	C (User Input)

Table B1 (cont'd.)

SECTION 4

Group A

Date of Initiation of Action:	C (User Input)
Date of Completion of Action	C (User Input)

Group B

Total Terminated or Relocated Positions:	C (User Input)

Group C

Terminated Positions Held By:	C (User Input)
Permanent Military Who Transfer:	C (User Input)
Permanent Military Who Retire	C (User Input)
Military Trainees Who Transfer:	C (User Input)
Civilians Who Transfer:	C (User Input)
Civilians Who Retire:	C (User Input)
Civilians Who Are Placed by DOD:	C (User Input)
Civilians Who Separate From DOD:	C (User Input)

Group D

Change in Procurement Expenditures Due to Action:	C (User Input)
Change in Construction Expenditures Due to Action:	C (User Input)

Group E

Current Procurement Expenditures:	C (User Input)
Commissary and BX Purchases by Retirees:	C (User Input)

SECTION 5

Group A

Total Personnel Employed by/Assigned to Base:	C (User Input)
Number of Military Personnel Assigned to Installation:	C (User Input)
Military Permanent Parties:	C (User Input)
Military Trainees:	C (User Input)

SECTION 6

Group A

Number of Cities To Be Analyzed:	C (User Input)

(Repeat Groups B Through G for Each City To Be Analyzed)

Group B

Name of City (1):	C (User Input)

Group C

Number of DOD Personnel Currently Residing in This City:	C (User Input)
Civilian:	C (User Input)
Military:	C (User Input)

Table B1 (cont'd.)

Group D	
City Population in Year t(Paz):	C (User Input)
Date of Paz:	C (User Input)
City Population in Year t(Pbz):	C (User Input)
Date of Pbz:	C (User Input)
Group E	
Number of Years of City Population Data:	C (User Input)
(For Each Year of Population Data:)	C (User Input)
City Population (1):	C (User Input)
Date:	C (User Input)
City Population (2):	C (User Input)
Date:	C (User Input)
City Population (3):	C (User Input)
Date:	C (User Input)
City Population (4):	C (User Input)
Date:	C (User Input)
City Population (5):	C (User Input)
Date:	C (User Input)
City Population (6):	C (User Input)
Date:	C (User Input)
City Population (7):	C (User Input)
Date:	C (User Input)
City Population (8):	C (User Input)
Date:	C (User Input)
City Population (9):	C (User Input)
Date:	C (User Input)
City Population (10):	C (User Input)
Date:	C (User Input)
Group F	
City Housing Stock Size in Year t(Haz):	C (User Input)
Date of Haz:	C (User Input)
City Housing Stock Size in Year t(Hbz):	C (User Input)
Date of Hbz:	C (User Input)
Count of Owned Units in 1970:	C (User Input)
Count of Rental Units in 1970:	C (User Input)
Most Recent Count of Owned Units:	C (User Input)
Most Recent Count of Rental Units:	C (User Input)
Group G	
Latest Total Housing Vacancy Rate:	C (User Input)
Most Recent Owned Vacancy Rate:	C (User Input)
Most Recent Rental Vacancy Rate:	C (User Input)
Group H	
Number of DOD Personnel Currently Residing in Rest of ROI:	C (User Input)
Civilian:	C (User Input)
Military:	C (User Input)

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